40 Rock

POPULAR Computing WEEKLY

Only 45p.

18-24 July 1985

It's the best selling weekly

Vol 4 No 29

'U'-turn as QL gets 3½" discs

SINCLAIR – in so apparent switch of policy – is to bring out a disc drive and interface for the QL under its own name

The company had previously strenuously resisted such a move despite strong pressure, being committed to microdrives as its sole mass storage medium

The Sinclair QL disc drive will be by Microperipherals which already produces a disc unit for the machine

The Sinclair-labelled version should be available within a month

The 3½ inch drive has an unformatted capacity of 1M, a formatted capacity of 720K, and takes double-sided, double-density discs Up to four drives can be 'daisy chained' together, the second drive plugging into the back of the first, and so on The disc interface plugs into the QL's expansion port.

"It's not a new disc drive, we've been shipping since March," said Richard Miller, Microperipherals' technical manager "Sinclair has been interested in badging a disc drive for about seven months now, so we were very pleased to get the contract,

continued on page 5

Amstrad 128K in autumn launch?

IT APPEARS that Amstrad may now be planning to release its disc-based, 128K 6128 machine in the UK this autumn.

The 6128 is a version of the recently launched CPC 664, with a revamped keyboard, bank-switched memory up to 128K, and more enhanced versions of the CP/M and DR Logo which are bundled with the 664. The 6128 was first shown to the American market at the summer CES in

continued on page 5

Sinclair looks at optical cards link

METALAB Sinclair's research facility, has been looking at the applications of optical memory systems such as the Philips CD Rom player (pictured below)

The company is also very interested in a new form of optical memory storage, the Drexon LaserCard. Manufactured by the Drexler Technology Corporation in California's Silicon Valley, the LaserCard is a credit-card sized piece of plastic with a strip of photo-optical recording material on it

Up to an incredible four megabytes of information can be recorded on just one card, and there are two types – one is read only, the other write/read, or 'write once' The former have to be factory prerecorded, while the latter can be written to with a low power laser Neither type is erasable

The read only cards can cost as little as £2 to manufacture and a card-reader costs around £250

Drexler has licensed the rights to develop applications for the cards to about 20 companies around the world

The only licensee in the UK is Robert Maxwell's British Printing and Communication

continued on page 4

Frankie is pick of the week

INSIDE

- Sinclair £1.5m writ
- Rom card breakthrough

INSIDE) MICRO LANGUAGES – SPECIAL FEATURE ISSUE)


SPECTRUM
£6.95
COMMODORE
£7.95
AMSTRAD
£8.95
AVAILABLE NOW
Frank Bruno's
BOXING
GAME FEATURES
● Eight fiery opponents, each with their own distinctive fighting style
● Smooth-scrolling camera action, giving the best view of the fight at all times
● Furious three minute rounds with 'knock-down' and knock out features
● Warm-Up and 'Autoplay' sequences
● K.O Meter, Best K.O Time, Score and Bonus displayed on screen.
● Additional boxers to load from tape
● Hall of fame
● Endorsed by Heavyweight Champion – Frank Bruno.
elite
Elite Systems Limited Anchor House Anchor Road Aldridge Walsall West Midlands Telephone (0922) 55852 Telex 335622 SPETAL

CONTENTS

Vol 4 No 29

4 NEWS
Software on the cards

11 SOFTWARE REVIEWS
Buck Rogers on Spectrum – Monster Trivia on C64

14 LANGUAGES SPECIAL
Forth on Amstrad – Ada on C64

17 LANGUAGES SPECIAL
Boris Allan looks to the future

20 LANGUAGES SPECIAL
John Cook talks to Occam author David May

22 STARGAME
More machine code action on the Spectrum

24 THE QL PAGE
When is a bug not a bug?

26 BBC & ELECTRON
Simple Logo on the BBC B

30 COMMODORE 64
Ideal for Forth users – random disc access

6 Letters
28 Amstrad
32 Arcade Avenue
35 Adventure Corner
41 Adventure Helpline
42 Top Ten Charts
43 New Releases
44 This Week
46 Puzzle, Ziggurat, Hackers

EDITORIAL

It is now a month since the first announcement of Robert Maxwell's proposed take-over of the troubled Sinclair Research

If the details of the deal were uncertain then, they are now hopelessly confused

Each week brings new conflicting reports detailing which parts of the Sinclair company are either included or have been left out of the deal The only certainty now is that pressure is increasing quickly for Sinclair to finalise an agreement with Maxwell as soon as possible

Sir Clive's problems are escalating and his separate venture Sinclair Vehicles is now in trouble with Hoover pressing for payments of money it claims it is owed He is being squeezed from both sides

The Maxwell delays are beginning to damage Sinclair Research

The uncertainty is bad for morale and the company urgently needs a sound financial footing to enable it to produce its up-coming new micros – the suggested 128K Spectrum and the Pandora portable

At the same time Sinclair Research needs a confident business direction to ensure it doesn't get side-tracked as it has done in the past with inadequately market researched decisions such as that to use microdrives in the QL Perhaps Sinclair's agreement last week to endorse a disc drive for the QL signifies a change of attitude of the company on the other hand the choice of the Micropheripherals unit must be a set-back for software houses hoping for a standard DOS to emerge

It must be hoped that the Maxwell deal eventually comes off The two companies have a lot to offer each other Maxwell's information technology interests are considerable – both as an information provider and with licensing deals like his acquisition of rights to Drexler Technology's 4M capacity optical Rom card

However the more protracted the Sinclair/Maxwell negotiations become the less likely is it that a successful deal will eventually be struck

And all the time, the future of the UK's biggest volume micro manufacturer is balanced on a knife edge

Editor David Kelly **News editor** Christina Erskine **Features editor** Graham Taylor **Software editor** John Cook **Staff writer** Martin Croft **Production editor** Lynne Constable **Editorial secretary** Lucinda Lee **Advertisement manager** David Lake **Assistant advertisement manager** Jeremy Kite **Advertisement Executive** Diane Nolybak **Classified executive** David Osen **Administration** Geraldine Smyth **Managing editor** Duncan Scot **Publishing director** Jenny Ireland **Published by** Sunshine Publications Ltd 12 13 Little Newport Street London WC2H 7PP Tel 01-437 4343 Telex 296275 **Typeset by** Publishers Reprograph cs Services Ltd 4 Roger Street London WC1 **Printed by** Greenaway Harrison Sutton Road Southend-on-sea Essex **Distributed by** S M Distribution London SW9 Tel 01-274 8611 Telex 261643 (c) Sunshine Publications Ltd 1985

ABC

86 062 copies sold every week (Jan-June 1984 ABC)

Popular Computing Weekly Tel: 01-437 4343.

How to submit articles Articles which are submitted for publication should not be more than 2000 words long The articles and any accompanying programs should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted **Accuracy** *Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work

Computer Trade Association Magazine of the Year

Home micro 'card' software arrives

SOFTWARE programs up to 128K in size will soon be available for all the top home micros in a convenient form, the shape and size of a credit card.

Developed in Japan by Astar international, the new software cards – an alternative to cassettes or discs – are being distributed in the UK by Electric Software of Cambridge and will be available this autumn.

The program is contained either in a thin Rom chip or in a battery backed-up Ram chip which is then sandwiched between two slices of plastic, with an edge connector at one end. A special adaptor to plug in the cards is needed for each type of micro which will be priced at around £10.

Already there is an MSX version with Electric Software developing Spectrum and QL versions. Other UK firms will be working on adaptors for the Commodore 64, BBC B, and other leading micros.

Electric Software's own range of Rom games for the MSX is already available on credit card – or Sofcard, as Astar calls it – retailing at between £14.95 and £19.95.

Astar and Electric Software are pushing the Sofcard as an anti-piracy device. According to Mike Hall, Electric Software's spokesman, "Beyond, Activision and US Gold are very positive, as are distributors like Lightning."

The major drawback, however, is price – as Mike Hall is ready to admit. "If we cannot get the price of games on Sofcard to £9.95 within a year, the whole thing will fail."

At present, Astar has produced Rom cards which have to have the program put on the chip at the factory, and Eprom cards, which users can write to once only.

The next step is electrically erasable Eeprom cards, and then Ram cards. It is the last which Mick Rouse sees as offering a cheap and viable alternative to disc drives.

The cards will come in 16K, 32K and 128K sizes. The Ram cards will also include a small battery with an estimated life of two to three years.

While the 128K chip is likely to be the largest that will be put on to a Sofcard because of the restrictions on access via the edge connector, Mick Rouse sees no reason why there cannot be more than one chip on the same card.

Electric Software's parent company, GST Computers, has been exploring business, industrial and commercial applications.

Amongst these are security devices, keys and smart credit cards. Business software houses are apparently particularly interested in the card's ability to self destruct after a set period (when the battery runs out). "Some business software packages are licensed for a limited period – if you program them so that they will only run if a Sofcard is also present, you can enforce the licensing period by having the card destroy itself when the license period is up," observes Mick Rouse.

Home micro Rom card

Astar's UK agent, Peter Ryde, says that market research surveys conducted on behalf of the company have suggested that some 20 million Sofcards can be sold in Europe within the next 18 months – and up to 80 million within five years.

In Europe, however, the Astar card will be up against existing smart cards – French banks have already ordered three and a half million Ram cards to be used as intelligent credit cards from Bull, a French government-owned electronics firm.

Optical Roms

continued from page 1

Corporation – and it is another of Robert Maxwell's companies Hollis, which is to take a controlling interest in Sinclair Research.

Peter Howgate, managing director of the information services division of BPCC Graphics, the company which has been looking at the Drexler LaserCard, said that "discussions will take place with Sinclair."

He further commented that "the QL would fall squarely in the area where you could apply this technology." He believes that the card could easily be used to hold both business software and detailed documentation, but sees little immediate likelihood of it having any home use.

Metalab's chief Richard Cutting, however, said that Sinclair is "well aware of Drexler technology, and we have been talking to that company."

Sinclair is also apparently evaluating the potential of compact optical disc storage devices. Metalab is thought to be currently looking at a prototype Philips CD Rom player, although Richard Cutting declined to comment on such a possibility.

Drexler optical data cards

Metalab's interest in these new high-capacity optical storage devices doesn't mean however that it is unlikely to continue with its large-scale wafer storage research.

Ricard Cutting claims Sinclair will still be pursuing the wafer scale integration project. "It was well publicised before the takeover that we were pursuing that line of research, and there is on reason why we should not continue to do so."

He also suggested that Sinclair was close to getting funding for the project which has been estimated to require some £50 million.

● He also confirmed that the Pandora, the Sinclair 128K portable micro under development, would be compatible with the Spectrum, supporting Sir Clive's recent statement on Thames TV's *Database* that the Pandora would use Spectrum, rather than QL, microdrives.

If so, the Pandora would have to include a Z80 or compatible chip, but Richard Cutting also remarked that "the era of the Z80 is coming to an end" and went on to suggest that the 68000 was its logical successor.

This increased speculation that the Pandora may be a Z80-68000 twin processor machine.



Jerome Drexler

Clive's writ

SIR CLIVE Sinclair's problems deepened at the weekend with news that Hoover – the company which manufactures the C5 electric vehicle – has taken out a writ against him for non-payment of £1.5m in outstanding debts incurred by his Sinclair Vehicles project between November 1984 and June 1985.

The writ was obtained by Hoover some weeks ago and has yet to be served on Sir Clive. Instead its existence is apparently being used to apply further pressure on Sinclair.

Commented a spokesman for Sinclair Vehicles: "Hoover has not to date attempted to serve that writ – and until they do, as far as Sinclair is concerned, it effectively does not exist." Sir Clive is currently on holiday in the US.

UK firms let-down as USSR goes MSX

RUSSIA has made the first moves in its scheme to equip its schools with micros – and the first order has gone to MSX, the Japanese consortium

The Russians, through the Institute of Science and Technology, will pay around £2m for 10,000 MSX machines

The decision is a bitter disappointment for the British companies which are also vying for a share of the potentially huge Russian schools contract

Acorn, Sinclair and Memotech were all hoping to sell a substantial number of machines to Russian educational establishments when the COCOM restrictions on technological exports to the Eastern bloc are lifted later this year

"While the timing of this order is not surprising, it is a little surprising it went to MSX," said Joe Black for Acorn International.

"This order looks like a short term contract, and I would think there will be a number of short term purchases made for different machines."

"The Russians did say they wanted 10,000 machines for this year to get their educational programme going, so this deal means Memotech did not get the initial order," said Memotech's Jeff Wakeford. "However, they have asked us to go back to the Soviet Union with the Memotech micros in August, so at least they're still interested

It is thought that the Soviet contract with the MSX group does not involve any manufacturing rights, and is valid only for one year

QL 'U' turn

continued from page 1

particularly as our interface uses a different DOS from the other QL disc units." Micropheripherals' DOS is, in fact, written by Richard Miller himself

Sinclair appears to have decided that a Sinclair-badged disc unit will boost sales of the QL, while a continued reliance from Sinclair solely on the microdrive would not.

It is not yet clear if Sinclair plans to release disc-based software under its own label

"Sir Clive personally is very much wedded to microdrives he feels they are a great breakthough," said a Sinclair spokesman. "However, the decision to badge a disc drive doesn't contradict that, it simply acknowledges that people have different needs"

Amstrad's 128K

continued from page 1

Chicago at the beginning of June At that time, Amstrad said the 6128 would not be launched in this country until next year

Now it is thought Amstrad may be planning a launch at the *Personal Computer World* Show during the first week of September

Adventure specialists Infocom and Kuma, which wrote some of the first Amstrad software, have both expressed an interest in writing for the 6128, and high-street chain store Rumbelows is also considering stocking the machine when it is launched

"Amstrad machines sell well and are very reliable We are closely considering machines like the 6128 Although I have only seen it at the show it would seem to be the sort of machine that would appeal to people who have bought machines from other companies, as well as other Amstrad micros," commented a Rumbellows spokesperson.

GEC plans £150m chip factory

GEC, the electrical giant, has announced it is to spend £150 million on building a chip manufacturing plant in Britain.

This will be the largest British investment yet in the micro chip market, with an initial expenditure of around £60 million

The news comes as both Inmos and STC have found themselves struggling after the dramatic drop in the price of semi-conductors

However, GEC will be manufacturing for highly specialised markets such as the military and telecommunications industries. The plant, for which no opening date nor exact location has yet been set, will be run by the GEC subsidiary Marconi Electronic Devices

MUD on the road

BRITISH Telecom is planning a major promotional campaign for MUD 2, the new version of the multi-user play-by-modem adventure game which is to be launched at the *Personal Computer World* Show in September

The original MUD is still running on the University of Essex computer as well as on Compunet, but MUD 2 is an expanded version of the game specially commissioned by BT



Richard Bartle and Roy Trubshaw, who wrote the original five years ago while at Essex University, are creating MUD 2 at the moment.

Users of the game, which will be running at night and on weekends, will have to purchase a 'MUD Pack' from BT This will cost £20, which includes registration fee, full instructions for playing the game, a map of the Land of Mud, a credit card with personal codes on it, and 30 credits

They will also need a 1275 baud modem and terminal emulation software

One credit will last for six minutes, which means that the game will cost £2 per hour plus phone charges, to play

Mike Anderiee of BT's New information Services says that MUD 2 will be running on a Vax 11/750, with an initial 40 lines, increasing to over 100 lines later

If MUD 2 proves successful, BT intends to put the game on computers across the country

"Our intention," Anderies said, "is to make MUD 2 as cheap as possible"

For the first month of operation, between the September and November 5, MUD 2 will be free to users who have bought or ordered a MUD Pack.

Popular QL

Having read John Ure's letter in *Popular* I feel that he fails to appreciate that the QL is a 'popular' computer (50,000 have been sold, I believe which may not be in the same league as the Spectrum or Commodore 64, but is more than many) and that some of us are serious users who like to know a bit about the serious software available.

Would Mr Ure consider spending £50 on a program he knew nothing about?

I am not particularly interested in arcade games, (although I must admit a liking of *Lords of Midnight*) but am more interested in serious work, as are many QL owners, and we don't moan about the games reviewed.

I Robertson
Crewe
Cheshire



This is the third clue in this competition being run jointly with Thames TV's *Database* program and Micronet 8000. Details of where to send your entries will be published next week.

Part 3

Centuries ago as the water swelled,
The Holy Grail lay in the Chalice Well
From Joseph's staff thrown down for a rest
Grows the thorn bush, flowering in winter best
Where a wounded King, carried by we black-clad Knights,
Was taken to die on this Isle, a Tor of great height.'

Part B

'Experience though noon auctoritee
Were in this world is right ynogh for me
To speke of wo that is in mariage
For lordynges, sith I twelve year was of age
Thonked be God that is eterne on lyve,
Housbondes at chirche dore I have had fyve –
If I so ofte myghte have ywedded bee
And alle were worthy men of hir degree

Ne no line naise all the Tales are like this!

A key press

Just a little tip. When the Commodore 64 is switched on, you only get one letter however long you press a key. Typing *Poke 650,255* will give you multiple letters from one key press (depending on how long you press that key).

Poke 650,00 returns it to normal and *Poke 650,100* will make all keys (including delete, etc) need multiple presses.

Hope you find the pokes useful.

Nicholas Coles
Armsworth Park Farm
Alresford
Hants

Too serious?

As the writer of *Beatle Quest*, I would like to express my sadness at the reactions of Beatle 'fans' to *Popular's* complementary review. I took all the comments with my tongue in my cheek and laughed heartily at the mention of (Neil). I only hope that all those 'fans' who buy and play *Beatle Quest* will forgive any own mention of (Neil), try dropping the cigarette!

As for myself, I haven't had my head in a bucket either, despite being 31. I have all the albums including those 'funny' ones with white labels and recommend that life isn't taken too seriously. As John said, "You'll get yours yet".

Gerry Marsh


EPYX goes GOLD
64
DISK £14·95
CASSETTE £9·95
DON'T BE SCARED... IT'S NOT DIFFICULT... JUST...
IMPOSSIBLE MISSION
All the critics agree . . . Impossible Mission has a unique place amongst today's software classics. Superb graphics, synthesized voice and original game concept will keep you coming back for more. Already voted "Game of the Year" by British Micro Awards 1985, it is surely destined to become an all time great. Are YOU ready to face the most impossible mission yet devised???
"Outstanding graphics, sound and amazing digitised speech". ZZAP! 64
PITSTOP II
Head to Head racing · Superb Animation · 6 different Circuits · On-Screen Map · Full Pit Facilities
"Pitstop II is a stunning and innovative arcade game and should prove to set new standards in the race game . . . The best race game yet." ZZAP! 64
"The graphics are excellent and the sound is great—lots of roaring engine sounds—best of all, though, Pitstop II is great fun to play . . . A Star Game." Computer & Video Games —May 1985
BREAKDANCE
Epyx products are available at good computer stores and selected branches of JOHN MENZIES · BOOTS · W.H. SMITH
U.S. GOLD
EPYX COMPUTER SOFTWARE

On the cards

Program *Rom Board* **Micro** Amstrad **Price** £39.95 **Supplier** Micropower, Sheepscar House, Sheepscar Street South, Leeds LS7 1AD

Micropower are producing an extremely extensive selection of Roms for the CPC machines to be released over the next few months and the inevitable corollary of this is that you need somewhere to plug them in.

Unlike the Arnor Rom reviewed a few weeks ago, the Superpower system gives you a board capable of taking up to seven plug in chips of 8 or 16K. The chips are supplied free standing and without any dongle protection – as in the BBC.

Arnor's Rom board, in its present form, will not accept free standing chips.

It doesn't make sense to buy both systems – leading to an expensive, and jumbled spaghetti of cards in the back of the CPC, no matter how good the rival programs are. The only serious omission from the Micropower product is that there are no Rom management commands as provided by Arnor – these can be used to interrogate the commands of all the Roms and turn off selected ones if they use parts of Ram that conflict with programs, etc.

The price can be mitigated somewhat – if you order quickly you will be entitled to a free Rom containing Micropower's game *Ghouls*. It was a big hit on the BBC and it runs much better on the CPC than the majority of conversions.

The other consideration is that Micropower's board is well made and has the support of an established company. It comes in a well finished box and wins the prize for the peripheral that fits best into the back – absolutely snug with the computer casing and no sign of wobble at all which is more than Amstrad themselves seem able to do. There is, of course, a through bus for the disc drive.

Documentation is also good – explaining how to fit the chips the way in which the computer allots priority to a given Rom, how to lower the priority of the computer's Basic, etc. With the potential of their range of Roms that will be appearing, my feeling is that it could be one of the most important add-ons you could buy.

Tony Kendle

Mailings

Program *Mailing List Rom* **Micro** Amstrad **Price** £39.90 **Supplier** Micropower, Sheepscar House, Sheepscar Street South, Leeds LS7 1AD

It is always difficult to comment on programs like this – a specialist utility with a very finely defined application. It could be exactly the thing you are looking for, or a complete waste of time. For people who have a desperate need for a mailing list database its usefulness may even be such that it justifies the cost of the entire hardware – computer and all.

The program is derived from Micropower's own mailing list utility that runs on a Nascom mini so it has a reputable pedigree. Putting it in Rom is less of an obvious move than with some utilities. Once the majority of club members or whoever has been entered it is conceivable that the program will only be accessed monthly – hardly an inconvenience to load it from disc or tape. However the principle reason is that it frees the entire Ram for storage of names, addresses and other details, helped by the fact that all records are of variable length so that no space is wasted – typically about 300 people can fit. Ram is used wherever possible for speed of access but you are provided with a routine for splitting the data into linked files that can be read in turn when looking for data. In that way you can have lists of many thousands of people.

New names are entered in order so that searching is still very quick but this does make insertion slightly complicated when linked files cross several discs – you have to merge files, split them again once revised etc. It is made as automatic and painless as possible but still involves swapping discs all over the place – at this point the normally readable manual reaches its densest phase complicated by almost deliberately obscure choices of file names. Attempting this on a tape deck, may be a guaranteed ticket to the nut house. Still it does work, and following the instructions (slowly) will guarantee security of data.

The program is menu driven an option that every time you press the appropriate key a screen of information appears giving help on the use of commands – the documentation need only be worked through once to pick it all up.

Tony Kendle

Basic Plus

Program *Basic Extensions and Toolbox Rom* **Micro** Amstrad **Price** £39.90 **Supplier** Micropower, Sheepscar House, Sheepscar Street South, Leeds LS7 1AD

Locomotive Basic is generally accepted as being one of the best available on a home micro, but doubtless everyone could name some features that they would like added – whether it is games oriented sprite control or highbrow structured procedures.

The thing that Amsoft received most criticism for after the launch of the 664 was that there was to be no Rom upgrade available for 464 users to employ the graphics commands. If nothing else this is a disincentive to commercial companies to use them. However for those who want to have access to the facilities for their own programs, or for converting listings, you are supplied with the equivalent of most of them and much more besides on this chip, a very smart move since it could add considerably to its sales appeal. The only missing command that I would like to see is the disc error function *Derr*.

Ultimately your decision on whether it is worth the price tag depends on the available commands, and I could do no better than to list the major ones here. The version I had was pre-production, and it is possible that some additions will be made later so check with Micropower for more details. Of the 664 commands you are given these equivalents – graphics *Pen* and *Paper* colour control, transparent mode, masking to produce patterned lines colour *Fill Copychr$* for reading characters off the screen and frame for smoothing animation.

Additional graphics commands include a VDU command as in the BBC *circle* and some very fast turtle graphics.

Many people will welcome the music micro language as in the MSX machines – no more hunting through frequency tables – just type GGMDD etc.

Programming aids include *Ltron* and *Ltroff* – sends the trace output to the printer, *RemKill*, string find and replace for your Basic programs, screen switching, an editor and a memory editor – the latter two are functional but not the best I have seen. There is an in-built UDG designer that automatically produces the appropriate Basic lines for inclusion in your programs. You can also obtain *Info* about start locations, length of files, etc, and *Unprotect* files. The *Command* command gives you on screen details about the function and syntax of all the new words.

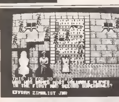
Printer controls have been expanded to include a monochrome and a shaded screen dump and an *Echo* function that reproduces what is printed on screen. Printers can be toggled between Epson and Amstrad types.

More than any other language Basic has lost all pretensions to standardisation in favour of control over the hardware.

Some of these facilities are fudging the definition even more between ordinary commands and in-built utilities, but there is no doubt that this is a step up for the 464's sound and graphics.

Tony Kendle

Reviews



Monstrous

Program *Monster Trivia* **Price** £8.95 **Micro** Commodore 64 **Supplier** US Gold, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY

If you think that the title *Monster Trivia* suggests some sort of arcade game then you're in for a big shock. US Gold's latest offering is, in fact, a rather weird quiz game based on last year's Christmas biggy *Trivial Pursuit*.

At first sight, the claim that the program contains two thousand different questions seems impossible. However, this problem resolves itself when you realise that the 15 different levels each require a separate data base, loaded from side B of the tape.

The quiz takes place in the cellar of the mad professor's mansion. Behind a door lives the hideous, unspeakable, incredibly dumb – the Trivia Monster. During the quiz you see him pounding on the door and peering through the windows. If a contestant makes too many mistakes, he breaks down the door and drags the culprit off. All very terrifying!

Now, down to the questions. They are taken from six different categories – sport, history, arts, science, showbiz and grab-bag. Each player answers three questions from all the sections. Most of the questions are pretty obscure – for example, "What is a biologist who studies smut interested in?" Who would have guessed that the answer is fungi? Still, I suppose it all adds to the fun. Being an American game, the questions are all related to the USA, so they can prove to be a bit taxing for us Brits. (Do you know how the Cleveland Browns got their name?) Surely they could have changed a bit for this country – there's a difference between deliberately obscure questions and impossible ones. I love the monster sequence, though.

Tony Hassey

Checker

Program *QSpell* **Price** £19.95 **Micro** Sinclair QL **Supplier** Eidersoft, Hall Farm, North Ockendon, Upminster, Essex RM14 3QH.

The most useful add-on to a word processor, after the mailing shot facility, is the spelling checker. All the standard business programs have one and now we have *QSpell*.

QSpell contains some 25,000 words in its dictionary, which is not an awful lot compared with upwards of 80,000 in many of the standard US checkers. The dictionary does not contain words like *wouldn't*, *fare* and many other "ordinary" words.

QSpell, is very very slow and long-winded. First, the text is written using standard *Quill*. Having previously made a special version of *Quill*, using the main *QSpell* program, this is fired up and your file loaded in. Now the checker works (extremely slowly) through the file stopping at words which cannot be matched successfully against the resident dictionary (either the standard one as supplied or your own custom-made version, containing, maybe, technical words peculiar to your own profession). The user then is given the choice of marking the word, or ignoring it altogether, if it is actually correctly spelt (it is, unfortunately not possible to add these "unique" words to the dictionary at this time, unlike the American spell checkers). Once the file has been worked through, it is once more saved to cartridge. Only now can we alter and correct the spellings of those marked words – the file is loaded back into the *QSpell* version of *Quill*, which contains special commands to retrieve the highlighted text. Now, work through the text again, using *Quill* in the normal way to correct the spellings. Save once again. Now, the dictionary may be accessed and amended as desired.

Although I am usually a good speller, I'm a pretty haphazard typist, and I find on other spell checkers I can quickly run through the text after writing, correcting as necessary. If I'm stumped over the correct spelling, I can quickly scan through similar words in the dictionary. Using *Quill*, it would be very much quicker to band the text down and then, afterwards, calmly go through again altering wrongly-spelt words from within *Quill* itself. Using *QSpell*, the bad speller would have to make a note of each word picked out by the checker, and then compare it with the dictionary.

As a facility, then, for serious users, it has the drawback of extreme slowness (due, I believe, to the very slow display of the QL) and the fact that you cannot directly compare text words with dictionary words. This is the first version and a second version will correct another fault that this idiot found – the program allowed me to save a file with a normally disallowed ten-letter filename. Of course, I couldn't load it back for later editing, and had to resort to Superbasic, which luckily saved my skin and allowed me to re-save the file with a legal name.

For the writer working with long files a very slow and labourious way of cleaning up spelling.

Tony Bridge

Nostalgia

Program *Adventure* **Price** £3.95 **Micro** ZX81 16K **Supplier** Gavin Barker, 18 Fleming Field, Shotton Colliery, County Durham DH6 2JF

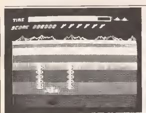
I'd forgotten the joys of the ZX81, the screen flash for every input, the blackouts while it thought. Could this be the future of computing? No messy attribute problems! No complaints of weak sound (there ain't none)! And no need for a reset button when Ram-pack wobble does that for you!

Seriously, about the only games for which this venerable micro is suitable are strategy and adventure. Here are three of the latter and for once you know they're not *Quill*-ed! In fact, they're Basic, but packed full by using separate Loads for Instructions.

The Challenge and *Haunted House* both contain graphics in that chunky Lego style we all once loved, but they're effective enough, although for my money I'd prefer more words as in *In Search Of The Black Stuff*. Still, presentation is neat with right justified text and only a few spelling errors, though objects taken have an irritating habit of remaining till you *Look* again.

This competent coding is let down somewhat by content. There's an element of collect the objects, use them correctly and walk through. There also appear to be a couple of odd bugs. So while it's hardly *The Hobbit* and not even *Artic*, and you won't want to dust off your hard membrane keyboard especially any secret sub-cultures of semi-Luddite 81ers should add an extra star and probably buy.

John Minson



Fast buck

Program *Buck Rogers* **Price** £7 95 **Micro** Spectrum 48K **Supplier** US Gold, Unit 10 The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY

Is this really Buck Rogers in the 25th Century? I mean, it looks more like Buck Rogers vintage '83 Actually it's a fairly good copy of the arcade classic, which is a speedy shoot 'em up and should please all who like that sort of thing But like so many of these American imports it looks stone-aged compared with state of the art games originated for home micros.

For those who've never squandered their ten pences on a pub machine, you fly your little craft over the fast moving surface of a planet, between posts (like some intergalactic ski run) zapping baddies Then it's into space to kill a lot more little green meanies before you tackle the mothership

Movement is fairly smooth, though I found judging the screen depth of the aliens difficult, you have a shadow but they don't. The demo mode is rather long and can't be broken out of, but that won't worry fans of the original, high score freaks and the odd homicidal paranoid who believes it's his or her duty to rid the universe of all malevolent life forms with a bit of mindless zapping The more cost conscious should baulk at the price though!

John Minson

Tiny horrors

Program *Project X – The Microman* **Price** £2 99 **Micro** Spectrum 48K **Supplier** Compass Software, 63 Cozens Road, Norwich NR1 1JP

If *Project X – The Microman* sounds like a 50's 'B'-movie, found late at night on telly, it should come as no surprise that this game lifts its basic premise from that sf classic, *The Incredible Shrinking Man*.

Actually a mole is a more likely adversary in this out-of-scale world where even a button and pin may prove useful and death can lurk at every turn.

There's a save to buffer option to encourage risk taking – an advance in adventuring I wholeheartedly applaud.

The atmosphere is strong; obviously the author has giv en some thought to the incredibility of the setting it pays dividends

Though the price is budget, the product doesn't look it, just the best of those films it imitates It's only available by mail order and deserves success

John Minson

Language Reviews

Fashionable

Program *Forth* **Price** £19.95 **Micro** CPC 464 **Supplier** Kuma Computers Ltd., Unit 12, Horseshoe Park, Horseshoe Road, Pangbourne, Berks RG8 7JW.

Forth is a very fashionable 'alternative language' on home micros since it offers the promise of the speed and compactness of assembler with many high level friendlier features. In brief you define various tailor made words, built up from smaller primitive words, which then become your program – the language is said to grow to match the end result and as a result can be very easy to read. As each word is defined it is compiled, giving speed but the final program is run in an interpretive way making for easier debugging, etc. The price to be paid is the superficially frightening reverse polish notation, eg. 'print 1+2' is written as '1 2+.' This looks to be almost perversely obscure but familiarity with the language shows that it derives much of its power from the arrangement (although there is no harm in redefining the word '.' to read 'print').

Kuma's version is to the Fig Forth standard, and also contains a library of routines such as screen editing colour graphics and sound, the latter especially being much simpler to use than the Basic's sound commands. One of the fundamental philosophies of Forth is that a defined word can be included in future programs without rewriting – so supplying a library makes a lot of sense.

Another integral feature of the standard is that the language should allow you complete access to, and control of the hardware. Usually this includes the storage device, discs, as a virtual memory system. Tape based Forths often try to avoid this and use Ram as pseudo storage (reverse polish mentality). However, Kuma Forth bravely attempts to exploit the cassette as far as possible. You can format an entire tape into a series of blank blocks each of which acts as a Forth program 'screen' for keeping your library of routines and data. The disadvantages are that you have to do a lot of rewinding etc, but if ever a machine could minimise the inconvenience of this it is the all in one 464 (this version will not exploit discs but a disc based release is also planned).

Tape handling is minimised by the addition of some clever additional words, expanded buffer size, intelligent header reading, etc. It is no more limited by this system than any tape based Forth but it does make it potentially more powerful for programs utilising lots of data.

The documentation is good and can take you a long way before you need to resort to a separate text, although some of the latter examples could do with more idiot proof explanation. Altogether an implementation that Kuma can be proud of.

Tony Kendle

Framed

Program *Dlan* **Price** £9.95 **Micro** CPC 464 **Supplier** Campbell Systems, 57 Trapp's Hill, Loughton, Essex IG10 1TD.

Something of a departure for Campbell Systems, who seem to have been permanently seconded to Amsoft these days.

Dlan is short for Display Language – a series of commands that fit into Basic Rem statements and which are designed to allow the screen to be used to produce eye-catching moving text displays for shop windows or other business uses.

However, as with any computer 'language' it is the ingenuity of the programmer that determines the potential use. You are provided with an Epsom screen dump facility, or you could use your own for a different range of printers, and the display can be used to produce posters, club infosheet titles, labels or whatever.

I have also used it to add fancy lettering to a picture produced with a screen designer and also for producing moving titles for home videos.

A variety of text fonts in a wide range of sizes are available, or there is a utility program included for designing your own.

This text can be scrolled, rolled, colour changed or whatever in the screen windows (many more are available through this utility than normal with the Amstrad screen) and each window can be bordered by a choice of frames.

Setting up the display via the supplied commands is incredibly simple, quick, and easy to use – the language also includes some simple input, subroutine and debugging commands, eg, single stepping, and the whole thing can be easily interfaced to your own Basic programs within the 12K free memory limitation.

Unless you tell it to stop, the routine will repeat and a nice touch is that the display can be 'locked' so that it can't be broken into or the computer reset by spotty boys (short of switching it off).

Tony Kendle

Unusual

Program *Ada* **Price** £49.99 **Micro** Commodore **Supplier** First Publishing, Unit 20B, Horseshoe Road, Horseshoe Park, Pangbourne, Berks

Ada is an unusual language that supports a high level syntax like Basic or Pascal, but converts this into machine code assembly language, and allows this machine code directly into memory under control of resident machine Basic.

The language was originally designed to control guided missiles, but fortunately has some other uses.

The package is divided into several units, Editor, Syntax checker, Grammar checker, Assembler and Disassembler. The manual is, in the main, excellent and does go some way to actually teaching you Ada rather than merely listing the features of the program.

Menus are a constant feature of the system – the Editor divides into start menu, write/edit and commands. The high level language is a fairly standard Basic variant with If/then operations and loops so doesn't present any real problems.

Used correctly, Ada can go some way to removing the need to program in machine code.

Graham Taylor

No effort

Program *Blast* **Price** £24.95 **Micro** Spectrum **Supplier** Oxford Computer Systems, Hensington Road, Woodstock, Oxford OX7 1JR

Blast is not a computer language, but fulfills the objective of writing fast programs without resource to machine code.

Blast is a compiler – one of many available on the Spectrum, but it is significantly different.

Blast gives you the option of having your programs compiled either into machine code or a special form of machine code called P-code. This has two major advantages over previous offerings.

Firstly, as object code (what your Basic program is turned into) it is much shorter than equivalent machine code and most important of all, it will convert *all* Basic commands.

This means that with almost no effort anything you write in Basic can be made to run around 40 times faster.

The ifs and buts are really only a matter of how much code can be held in memory at any one time.

It means that a) a microdrive is highly recommended b) if you are going to compile a long program from tape it has to be saved in a special way following instructions provided in a special Toolkit utility provided on the same tape.

Essentially all it does is divide your program up into manageable chunks.

The manual is superb and the system is a doddle to use. Marvellous, a vital utility for any Basic programmer.

Graham Taylor

Master Of The Lamps™
A Unique Adventure In Home Computer Software.

The King Is Dead. You're Next In Line.

But wait. Before you put on the jeweled turban and lift the royal sabre, there are a few "formalities" you must go through. Sometimes... "deadly" formalities.

When the king dies, three lamps are shattered, the pieces scattered to the wind and three evil genies escape. Now your journey to the throne begins, the perils await. As prince you must retrieve each piece of each lamp and capture each genie.

Fly with the wind on your carpet of magic. Enter, if you dare and if you can, the incredible world of each genie. Hold on to your carpet as you swoop, dive, bank and careen through always-moving diamond-shaped gates. Gates that guard each genie's domain. Calculate. Plan. Consider. Quickly. Quickly. Your heart is racing. Your mind must race ahead.

Each genie will challenge you with his ancient, mystical trials.

Concentrate. Listen to the tones. Watch the colors. Remember. Hone to their sharpest, your mental and physical reflexes. Each trial is harder. And the time to respond gets shorter.

The throne awaits, but not forever. The gong is struck, it tolls...



Available for Commodore 64

ACTIVISION
HOME COMPUTER SOFTWARE

Making small talk

*The end of the line for Basic? **Boris Allan** looks at the state of languages today and speaks his mind*

Whilst home computers still, stubbornly, come equipped with Basic there is every reason to believe that Basic's days are numbered. There are a number of developments in computer languages that go beyond tinkerings between different versions of Basic but fundamentally rethink how a language is used and the way it operates

The future looks interesting because, increasingly, computing is becoming interactive, and the environment in which computing takes place is becoming standardised

By standardisation I mean the way that microcomputer, minicomputer, mainframe and supercomputer, are starting to seem the same to the user, differentiated only by speed of execution. Given the increased importance of communications networks, where micro can talk to supercomputer and let the supercomputer do the work the concept of the 'micro' as an independent machine is going to seem less relevant

This convergence is explained by many factors but the main reason is the increasing importance of the operating system, and the effect this is having on the languages we use First, however, my choice of languages for the future:

- Functional programming languages (for example, Apl),
- Object oriented languages (for example, Smalltalk-80),
- List processing languages (for example, Lisp or Logo),

and

- System programming languages (for example, C or BCPL)

Different aspects of these languages will interact to produce new hybrids such as Objective-C (an object oriented systems programming language), but these are the four key styles in the future development of programming languages

All these languages will probably be programmed within a similar sort of system, and it is for this reason that I think it is useful to establish what distinguishes an operating system from a programming language Aspects such as windowing, use of mouse, or drawing by turtle graphics are relatively unimportant, because all these facilities can be emulated in most languages What is important are the other things a language can do.

If you consider machine code as being the fundamental level of computer operation, in that computers function by executing sequences of instructions expressed as machine code, then an operating system is the opposite end of the scale in computer operation. Programming languages occupy various points along the continuum from machine code to operating system, and some operating systems overlap in their capabilities with some programming languages.

The difference between an operating system, a programming language, and machine code is best illustrated by how each copes with the peripherals and devices attached to the computer For example, control of a device (say a printer) by use of machine-code programs is usually a matter of depositing information in specific computer locations according to specific rules. An ordinary programming language usually controls a device by name, without the user having to know anything about how the device works, eg, Llist. An operating system, however, will frequently allow the printer to be accessed via an on-screen command, so that the printer becomes only one of a range of possible output devices (including disc files)

The extensiveness of an operating system is reflected by the system's ability to control the devices available to the programmer. The more powerful and the more extensive the operating system, the fewer the facilities for input and output needed by any programming language Unix, for example, has so many facilities (indeed an abundance) for controlling the operation of the system, that the programming language developed to implement Unix has absurdly simple input and output facilities

C is a very low-level programming language (like BCPL) – close, if you like, to machine code – whereas Unix is a very high-level operating system. C does not depend upon Unix. C is a language which gives almost complete control over the workings of your computer (a bit like Forth) but in a more human manner than most Forth systems. I have chosen a systems programming language as one of my four languages of the future because such a language fulfils a particular and unique set of requirements

Alan Kay, one of the key language innovators – author of the icons language, Smalltalk, believes there is no real need for operating systems, because the programming language should fully contain and therefore replace the operating system. What Alan Kay means is the idea of an 'environment', where an environment is a program where language and operating system are united, and the user does not have to continually move from one set of commands to another different set to perform different types of task. Many of the integrated packages now available on computers illustrate such environments

Interestingly, primitive Basic on a ZX80 was an environment (there was only one command level), and Smalltalk is an environment, but most disc operating systems do not provide a coherent environment Smalltalk applies a consistent philosophy to the construction of a programming language. The basic notion is that of an 'object' An object is something which can accept information (messages), and act on that information in some way which is specific to the object, and then return information (a message) in a suitably modified form

For example, if the object is the variable *X* and the message you send to *X* is *Sin* then the message you get returned is *Sin(X)* Though the object metaphor may seem trite in this case, there are more powerful facilities. Objects can be placed in 'classes', and thus if there is a RectangleClass then any object in that

Language	Year	Author	Comments
Fortran	1952	John Backus FORmula TRANslation – first high level language – scientific and technical language – developed by IBM soon implemented on most modern mainframes	
Lisp	1959	John McCarthy – LIST Processing – first list processing AI orientated language	
Cobol	1959	Common Business Orientated Language Popular data processing language for business use.	
Algol-60	1960	Committee design first language with hierarchical structure.	
Logo	1960	Seymour Papert – first Educationally orientated language.	
Forth	1960	Fast language based on concept of word used to define procedure Hampered by 'reverse polish notational' and stack concepts	
Fortran IV	1962	Main implementation of original Fortran	
Basic	1965	Kurtz and Kemeny Beginners All-purpose Symbolic Instruction Code – has been continuously refined since original implementation	
Pascal	1970	Niklaus Wirth – powerful Algol-60 derivative	
Prolog	1972	Philippe Roussel – first symbolic logic programming language.	
Smalltalk	1972	Alan Kay – precursor of present 'icon and window' driven systems	
C	1972	Dennis Ritchie – low level language with high level data structures and control features.	
ADA	1978	Jean Ichbiah winner of American Department of Defence 'state-of-the-art' programming language competition – has structure and concurrency features	
Occam	1983	David May – novel concurrency and communication features – designed for parallel processing	

class knows (inherits) the knowledge of what it is to be a Rectangle, and it does not have to be reminded. There might be a WindowClass, of which RectangleClass is a subclass with restricted facilities. Smalltalk, by treating everything as an object to which messages can be send or received, achieved an integration of operating system and language not equalled by any other system.

As, during its development, Smalltalk produced those ideas which led to the use of windows, icons, and the mouse, Smalltalk (and the subject oriented philosophy) is going to be very influential for years to come.

In the real world of commercial data processing there are certain languages (such as Cobol or Fortran) whose whole aim is to crunch numbers or (in the case of Cobol) perform simple sums. Recently certain numerical programmers have isolated the 'von Neumann bottleneck' in languages such as Cobol or Fortran, where the bottleneck is how quickly data can pass through via the data bus. When a computer performs its operations, it can only perform one action at a time, though amazingly quickly in the case of some computers. Traditional programming languages, such as Algol, Pascal, or Basic, were developed around ideas which assumed the bottleneck. everything was repetitive, one step at a time, because the computer was repetitive, one step at a time.

To add a series of numbers, for example, the sequence is something akin to

```
sum = 0
for i = 0 to count
sum = sum + array (count)
endfor
```

in no language in particular. The idea is that it would be far better to say something like

```
apply + array
```

that is, apply the plus operator to the elements of the array. The result of this approach is to produce languages which are slowish on conventional von Neumann computers, but with multiple processors (and parallel computers) they begin to become far more attractive (APL is one example). For numerical work in particular, such languages are far better suited to newer forms of computer.

My final style of language for the future are the list processing languages such as Lisp or Logo, both of which are languages of great flexibility in database applications, or fields such as Artificial Intelligence and Expert Systems. Though both Lisp and Logo overlap with Smalltalk in that Smalltalk also has list processing facilities, there is sufficient difference in orientation for me to believe in their separate futures. Given the undoubted benefits of some of the techniques of AI, list processing specific languages are bound to continue to be of use.

In practice, no language could ever be perfectly suited for every type of application, so there will always be a demand for specific types of language (such as those isolated above).

For example, list processing languages such as Logo are capable of constructing very complex data structures (due to the power of the idea of a 'list'), but this strength is bought at the expense of speed of execution for floating point arithmetic. In theory, a language could be all powerful and all encompassing (as could an intelligent computer?), but the size of such a language translator would be so large that problems would be created.

Even if Ram was so cheap that it did not present any problem, and a processor was so fast that it could cope (or multiple processors could cope), there are certain rather more insoluble problems.

The main one is how to produce a highly complex system which is completely reliable (we all know how unreliable even simple micro systems are). It makes more sense to have specific language systems (with good general facilities) where each language can easily communicate its results for use by other languages. For such an arrangement we need an operating system, preferably an environment which is also a language.

This is my future scenario. The micro of the future is a workstation. The computer is essentially a total environment running an object oriented language (such as Smalltalk), where the appearance of the screen display has much in common with the Xerox Star workstation or the Tektronix 4404 Artificial Intelligence System (like the Mac or ST). The object oriented system produces a coherent, consistent environment in which the user can program, use packages, or can use the computer to communicate with other systems.

For many purposes the object oriented language will fulfil all the requirements for general programming, but for specific types of application the user will choose to use one of the other types of language. The object oriented language is interactive, and distinctions between compilers and interpreters will become less obvious (and much less important).

Operating systems on microcomputers are becoming more important all the time, and languages are developing so quickly that – given the relative decline in the cost of hardware – in a few years cheap systems with the facilities of the Tektronix 4404 will be with us.

The liberation of the individual which started with the Apple II will grow apace, as computers become far more open systems with fewer restrictions – and that's good news for everybody, not just programmers.

Tektronix 4404 Artificial Intelligence System running Smalltalk 80



SEE THE DOMESDAY PROJECT AND OPERATION RALEIGH IN ACTION
£500 WORTH OF ACORN PRODUCTS TO BE WON!
When you book an advance ticket you enter the prize draw.
THE THIRD
•OFFICIAL•
ACORN USER
•EXHIBITION•
Barbican Centre, London EC2.
25th-28th July 1985
STILL THE BIGGEST!
STILL THE BEST!
Four days of non-stop entertainment and business.
If you're an Acorn owner, user or just thinking of buying a computer you shouldn't miss the Acorn User Exhibition It's four days of fun, bargains, demonstrations and information
There are specialist areas for business, education, telecommunications, robotics and home use Each with special demonstrations, competitions, and brand new products. And there'll be experts to answer your technical questions
All in all, we're expecting over 120 different companies to be there, as well as Acorn themselves
And because the Exhibition is at the Barbican there's plenty of restaurants bars and rest areas
So if you're a businessman, scientist parent, teacher, computer fanatic or home user Don't miss the only OFFICIAL ACORN EXHIBITION
For information on stand availability ring Tim Collins on 01-930 1612
P.S. Acorn have promised some very special events exclusive to the show!
REDUCED PRICES FOR GROUPS
Entry only £1 per person for bookings over 10 people Complete form below
MISS THE QUEUES – SAVE MONEY!
Use the coupon below to save money and miss the queues Entrance at the door will be £3 for adults, £2 for under sixteens
NEWS FLASH
TRY OUT THE 'ENHANCED' BBC MICRO
PLAY 'REVS' THE MOTOR RACING GAME
ELITE II (6502)
SPECIAL ARCADE WITH PRIZES
HOW TO GET THERE
By train Holborn Viaduct Cannon Street, Broad Street, Kings Cross, St Pancras, Liverpool Street
By Underground Moorgate, Barbican St Pauls, Bank, Liverpool St
Computer Marketplace (Exhibitions) Ltd
(A Rushworth Dales Group Company)
20, Orange Street, London WC2H 7ED.
To Computer Marketplace (Exhibitions) Ltd 20 Orange St London WC2H 7ED
Please send ______ (Qty) Adult Tickets at £2 and
______ (Qty) Under sixteen tickets at £1 each
I enclose cheque/P O for £______ or debit my Access/Amex/
Diners / Visa card no ______
Signature ______
Name ______
Address ______
______ Postcode ______
POP/2
© Certain Advertising Ltd 01 930 1612

The parallel dimension

"Everyone and their dog thinks they can design a new computer language," says David May, author of Occam **John Cook** *investigates*

In the beginning, when mainframes were mainframes, and real programmers didn't use Pascal – simply because it hadn't been invented – there was machine code. Or, if you were lucky, assembler

Yet the few massive number crunchers then around were such a godsend to those relatively few academics who had access to them, no-one was complaining

As prices began to fall and computing power increased, however, the nature of the average computer user started to change No longer was computer access confined to just the dedicated computer scientist or mathematician, but instead mainframes began to be used by those who wanted computing power, without having to invest the time and effort in learning a low-level programming language

Thus, in the middle 1950s, the need for a high-level programming language evolved. That is, a way of communicating with the computer without an intimate knowledge of what is going on inside Look at a short example – the Basic program, **10** Input *a* **20** Print *a* The program will read a single number input from the keyboard and then print it to screen. Easy.

Now think of the actual machine operations involved in this 'simple' process, even leaving out how the program itself is stored in memory and run, it's not so easy. The variable must be stored in memory, loaded into the accumulator on the chip, a number must be added, the result stored, then outputted to the screen. Try changing line 20 to Print a+1*(76a/7 876^sin66) and you're running into serious problems.

In the 1950s of course Basic didn't exist, but the first step towards Basic was Fortran Fortran (short for FORmula TRANslation) has a pretty solid claim to be the first high-level language, it was developed by IBM in 1957 to run on their 704 machine This satisfied the scientific community, but the business world had to wait for Cobol (COmmon Business Orientated Language), released in April 1960 – around the same time as the Pascal precursor, Algol 60

Our familiar Basic (Beginners All-purpose Symbolic Instruction Code) first appeared at Darmouth College, New Hampshire in the USA – written by JG Kemey and TE Kertz as a simple introduction to computer programming

Developed from Fortran II (one of the many Fortran dialects) the fact that it is still the built-in language of most beginners micros – where are you now Jupiter Ace? – suggests the authors succeeded in writing probably the most easily accessible beginners language

From the early sixties, as computing power and research activity increased a wealth of computer languages has built up – some devoted to education, Logo, others to artificial intelligence, such as Prolog and Lisp, specialist languages like Ada used for US defence work or dedicated to graphics production like the Fortran derivative Gino-F.

Obviously a great deal of time and effort has been devoted to developing new languages many of which, even if they do get as far as seeing the light of day, certainly don't stick around until lunchtime

One feels forced to ask the big question, why? Why can't we all write in Basic? Why go to the bother of developing new languages when there are so many around already?

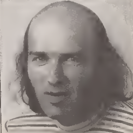
Mr David May, Chief Computer Architect at Inmos, the British semi-conductor manufacturer, is as well qualified as the next person to answer such questions He is the author of one such new computer language – Occam – designed to complement Inmos' novel Transputer chip.

"Everyone and their dog thinks they can design a new computer language," he explained, grinning broadly "It's only when you start getting down to it that you encounter the difficult problems."

Down to basics then (no pun intended) – what is a computer language? "Obviously it's a way of programming machines, but it's also a way to communicate programming ideas and concepts, as the authors of Algol-60 emphasised"

Right then. But why write a new language? David answered. "There wasn't one there for our needs – the need to express concurrency"

Concurrency – which can be trivially described as the ability to walk and chew gum at the same time – together with 'multi' – and 'parallel'-processing are the key words of the artifical intelligence world of the 5th generation computer



Many modern computer applications demand that several tasks be undertaken at the same time – David gave the example of his work with mobile robots in the early 70s

"It was difficult using conventional sequential programming (that is, as in Basic, when one instruction is carried out at a time) Our robot needed to move and analyse sensory information at the same time Switching from one task to another tended to produce very jerky movement."

The other trend that led to the development of Occam was the progress of VLSI (Very Large Scale Integration) chip technology – not totally unconnected with Inmos' own Transputer chip.

"The usual Von Neumann-type computer architecture assumed that processing power was expensive compared to memory – so you had one central processor linked to memory by one data bus But with Memory/Processor equality now in both size and cost, this all changes"

The result is the Inmos T424 – a 32-bit Transputer chip with 4K on-board Ram, an external memory interface, a peripheral interface, and importantly, four high speed serial links (which can be connected to other Transputers), all on a single silicon slice If networks of Transputers, or any similar multi-processing systems, are to be easily programmed, then a method of programming a number of tasks running simultaneously and a facility for easy communication between processing units is vital. Enter Occam, Stage Left

"In order to exploit the technology properly, we needed another new language" Occam was that language, written (on and off) between 1980-83, pri-

marily by David himself, with Professor Tony Hoare of Oxford University acting as his consultant, with various members of the Inmos team passing comments, writing test programs, compilers, etc

Much of the groundwork towards the creation of Occam had been done during David's research into concurrent programming at Warwick University in the mid seventies, in fact when writing it, he deliberately attempted to take the best features of all the work that was going on in concurrency about that time.

Initially, a great deal of effort was spent in defining what he calls the 'Semantics' of the language "Generally too much time is spent on syntax – it's usually described very formally, while description of the semantics reads more like prose! Syntax is important 'though – for familiarity like packaging almost"

May maintains that his new language genuinely offers something novel and isn't just a rehash of an existing system "I think a lot of language development in the 1970s was tending to elaborate on existing sequential languages instead of presenting new ideas."

Occam was named after the 14th century English philosopher William of Occam, whose learned principle can be abbreviated to 'If in doubt, leave it out.' David applied this rigorously to Occam "One of the big snares in language writing is putting things in which only *might* be needed Soon it then becomes bulky and unwieldy – and once you've put a particular feature in, it's harder to take it out."

With only 22 reserved command words – no-one can claim that Occam is a bulky language "Each additional concept is genuinely adding something quite new," claims David He continued, "Having got some kind of spec, I would write a very rough compiler to satisfy myself it would implement various things efficiently I was writing the instruction set for the Transputer at the same time – the two went hand-in-hand.

An important and novel aspect of Occam is its 'formalism' The idea is that a program can be broken down into components that can be proved formally – in the same way that a mathematical theorem can be proved – without running extensive test programs and simulations Given the potential size and complexity of multi-processor systems, such tests could never be exhaustive, so Occam adheres to a number of formalistic principles: good structure, no jumps and no pointers.

Although Occam was designed in tandem with the Transputer, May hopes he has produced a new language of general usefulness

There is a version running at present on the 68000-based Sage IV machine, so it could be adapted with relative ease for the ST and Amiga machines – the home micro market may yet see a version of Occam!

But what would be its advantages over a decent Basic? "It depends what you wanted to do If you wanted to write more interactive programs with multi-tasking like disc searches while using the terminal, or printing while doing another job, then you'd just write separate processes that would run at the same time" Such parallel processing just isn't possible in Basic

He does stress the ease of writing programs in Occam – several universities now use it as a first language to teach concurrency "There are tricks in the compiler and the instruction set that the programmer doesn't need to worry about What I tried was to present applications programmers with a virtual machine, so they can concentrate 90% on the application and only 10% on the programming"

Over 6,000 copies of the Occam Programming Manual have been sold now – and it is significant that half have found their way to the Land of the Rising Sun – underlining the fact that Occam has been tipped as one of the possible 5th Generation artificial intelligence languages of the future.

Cycles

Light cycles on the Spectrum by D Semmens

Recently, we published a two player m/c light cycles game for the BBC B. Now, by public demand, something similar for Spectrum owners!

The game itself is 100% machine code – taking up just over ½K of memory – including screen drawing, scoring, etc. When the game is over (first to five victories) the program returns to Basic, and asks for a new skill level.

First, type in Program One, and save on tape with *Save "1" Line 20*. Then type in Program Two (the machine code loader) and run it. The code generated should be saved after Program One on the tape with *Save "2" Code 40000,552*

Finally, type in Program Three, and save this directly after the code with *Save "3" Line 15*

Now clear the machine with *New*, rewind the tape and load as normal – the program should autorun.

If this does not work, check the machine code loader for errors.

Controls

Player One	Player Two
Z – left	N – left
X – right	M – right
C – down	Space – down
F – up	Enter – up



```
10 REM ** PROG 1 **
20 CLEAR 39999
30 LOAD ""CODE
40 LOAD ""
```

```
 10 REM ** PROG 2 M/C LOADER **
 15 CLEAR 39999
 20 FOR i=40000 TO 40581: READ a: POKE i,a: NEXT i
 30 PRINT "SAVE ON TAPE AFTER PROG 1 BY    TYPING SAVE "1"
CODE 40000,582"
 40 STOP
 100 DATA 175,50,156,99,50,157,99,50,8,92,62,1,50,162,99,62
 110 DATA 2,50,163,99,62,10,50,158,99,50,160,99,205,107,13
 120 DATA 62,2,205,1,22,62,11,50,159,99,62,21,50,161,99,62,1
6,215,62,2,215,62,17,215
 130 DATA 62,7,215,6,30,62,22,215,175,215,120,215,62,144,215
,62,22,215,62,20,215
 140 DATA 120,215,62,144,215,16,233,6,20,62,22,215,120,215,6
2,1,215,62,145,215,62,22
 150 DATA 215,120,215,62,50,215,62,145,215,16,232,62,17,215,
62,1,215,205,25,158,205
 160 DATA 97,158,205,223,157,62,16,215,62,6,215,62,22,215,58
,158,99,215,58,159,99,215
 170 DATA 62,146,215,62,16,215,62,4,215,62,22,215,58,160,99,
215,58,161,99,215,62,147
 180 DATA 215,33,162,99,58,8,92,254,122,202,105,157,254,110,
202,125,157,254,120,202
 190 DATA 110,157,254,109,202,131,157,254,99,202,120,157,254
,32,202,143,157,258,102,202
 200 DATA 115,157,254,13,202,137,157,58,162,99,254,1,202,149
,157,254,2,202,159,157,254
 210 DATA 3,202,169,157,58,159,99,60,50,159,99,58,163,99,254
,1,202,179,157,254,2,202
 220 DATA 189,157,254,3,202,199,157,58,161,99,60,50,161,99,5
8,158,99,71,58,159,99
 250 DATA 79,205,209,157,128,254,9,194,233,157,58,160,99,71,
58,161,99,79,205,209,157
 240 DATA 126,254,9,194,1,158,195,165,156,54,3,195,18,157,54
,4,195,18,157,54,1,195,18
 250 DATA 157,54,2,195,18,157,35,54,3,195,18,157,35,54,4,195
,18,157,35,54,1,195,18,157
 260 DATA 35,54,2,195,18,157,58,158,99,61,50,158,99,195,43,1
57,58,158,99,60,50,158
 270 DATA 99,195,43,157,58,159,99,61,50,159,99,195,43,157,58
,160,99,61,50,160,99,195
 280 DATA 68,157,58,160,99,60,50,160,99,195,68,157,58,161,99
,61,50,161,99,195,68,157
 290 DATA 33,0,88,17,32,0,25,16,253,22,0,89,25,201,58,164,99
,198,4,71,118,16,253
 300 DATA 201,205,223,157,205,223,157,205,223,157,58,157,99,
60,50,157,99,254,5,202,25
 310 DATA 158,195,71,156,205,223,157,205,223,157,205,223,157
,58,156,99,60,50,156,99,254
 320 DATA 5,202,25,158,195,71,156,62,16,215,62,5,215,62,22,2
15,62,21,215,62,14,215
 330 DATA 6,0,58,156,99,79,205,27,26,62,21,215,62,1,215,6,13
,62,32,215,16,251,62
 340 DATA 21,215,175,215,58,157,99,79,205,27,28,201,80,76,65
,89,69,82,46,49,32,32,32
 350 DATA 32,32,32,80,76,65,89,69,82,46,50,62,21,215,62,1,21
5,62,16,215,62,5,215
 360 DATA 62,22,215,62,21,215,62,4,215,6,22,33,75,158,126,21
5,35,16,251,62,21,215,175,215,201
```

```
 5 REM      ** PROG 3 **
10  REM ** CYCLES BY D.SEMMENS **
15 FOR i=USR "a" TO USR "d"+7: READ a: POKE i,a: NEXT i
20 FOR i=1 TO 2: BORDER 1: PAPER 1: CLS : NEXT i: INK 7
30 INPUT " LEVEL (1 TO 10) <<1=HARD>> ";a
40 IF a<1 OR a>10 THEN  GO TO 20
50 POKE 25508,a: INK 1
55 POKE 23561,1: POKE 23562,1
60 RANDOMIZE USR 40000
65 POKE 23561,35: POKE 23562,5
70 INK 7: PRINT AT 10,10;" GAME  OVER "
80 FOR i=1 TO 1000: NEXT i
90 GO TO 20
100 DATA 239,239,239,0,254,254,254,0
110 DATA 119,119,119,112,119,119,119,7
120 DATA 60,110,223,191,191,223,110,60
130 DATA 60,102,219,189,255,255,126,60
```

Quantum leaping

When is a bug not a bug – another quirk of the QL experience by ***Alan Turnbull***

Surely, all QL owners have noticed that famous – or should it be, infamous – 'bug' Yes, I mean the one when you press *(Ctrl)*, *(Alt)* and '7' at the same time. Just when you are expecting the QL to greet you with another one of those strange 'graphic' characters, it instead decides to peck up and go to sleep, leaving the bemused user somewhat 'out in the cold'!

You think to yourself, 'Oh dear, another Rom bug' and hope that one day Sinclair Research will op-grade the Rom and let you get your eager hands on it. Much to my amusement, the problem was still quite evident when I received an up-grade to my AH QL in the form of the JS Rom. But the famous QL bug is not a bug at all.

The keys *(Ctrl)*, *(Alt)* and '7' were used by the Sinclair Research design engineers, when the QL was in the early development stages, to emulate a non-maskable interrupt. The keys are sufficiently spaced apart so as not to be pressed accidentally (you hope). Upon pressing this sequence of keys, the QL's main processor is made to jump to a non-maskable interrupt server routine, the address of which the MC68008 expects to be held in a table of vectors in the first 'page' of memory (addresses 0 to 1023).

Unfortunately, when the QL was let loose on the public, someone forgot to whip out all of the 'test frig' and hence the bug which is not a bug! So much for the bad news. The good news is that the kind old souls in Cambridge have provided a mechanism within QDOS – the QL's operating system – for redefining the vectors which QDOS does not use for its own purposes.

QDOS needs vectors for its own *Trap* servers etc, but certain system vectors which are provided for by the 68008 architecture are simply not used. In fact if the circumstances that would cause such vectors to be accessed ever arise, the behaviour of the QL cannot be guaranteed. The Sinclair programmers have used the memory usually reserved for these vectors for other purposes.

Table 1 shows the vectors normally expected by the 68008 processor. Table 2 shows the vectors which are not used by QDOS and, hence, are the ones which QDOS allows to be redefined.

The ultimate good news you have all been waiting for is that the non-maskabe interrupt vector is not used and, therefore, can be redefined for our own purposes. Just think of the possibilities – you could provide a 'warm reset' key on the QL without getting a soldering iron out or invalidating the Sinclair warranty!

So what of the actual details of the mechanism within QDOS for allowing

Table One

(1)	– The initial value for the 'supervisor' stack pointer
(2)	– The initial value for the program counter (on the QL, this points to the 'cold-reset', Ram test routine).
(3)	– Bus error
(4)	– Address error
(5)	– Illegal instruction (illegal bit pattern found in next instruction)
(6)	– Divide by zero error
(7)	– CHK instruction executed (used for checking data register value limits)
(8)	– TRAPV instruction executed.
(9)	– Privilege violation (ie, an instruction reserved for use within 'supervisor' mode has been attempted from within 'user' mode)
(10)	– Trace. This vector allows applications to provide a trace or 'monitor' facility. After each instruction is obeyed by the processor, a jump is made to the monitor program through this vector, if the processor is in the trace mode
(11)	– Opcode 1010 (binary) emulation. This vector, and the next, usually allow applications programs to give meanings to unused opcodes. The facility has not been provided for you by Sinclair Research!
(12)	– Opcode 1111 (binary) emulation (cannot be used)
(13) to (24)	– Usually reserved for Motorola applications programs.
(25)	– Spurious interrupt received.
(26) to (33)	– Level 0 to Level 7 (non maskable) interrupt servers
(38) to (48)	– Trap #00 to Trap #0F instructions (QDOS uses Trap #04 inclusive)
(36) to (256)	– User vectors (obviously, not available as this space is in Rom)

```
INT_LEV7  EQU     $1C                    ; offset in new table of NMI vector
MT_TRAPV  EQU     $07                    ; TRAP #01 key for redefining vector table
TRAP5     EQU     $20                    ; offset in new table of vector for TRAP #05
          LEA     $0000C,A0              ; point to Address error vector in QL ROM
          LEA     TRAP_TAB(PC),A1        ; point to new vector table
          MOVEQ   #7,D0                  ; seven entries to be copied
          BSR     SET_UP                 ; copy from ROM to new table
          LEA     TRAP_TAB+INT_LEV7(PC),A1 ; point to NMI entry in new table
          MOVE.L  #$00168,(A1)           ; make entry point to 'cold-reset'
          LEA     $000BA,A0              ; point to TRAP #05 entry in ROM
          LEA     TRAP_TAB+TRAP5(PC),A1  ; point to TRAP #05 entry in new table
          MOVEQ   #11,D0                 ; eleven entries to be copied
          BSR     SET_UP                 ; copy from ROM to new table
          LEA     TRAP_TAB(PC),A1        ; point to new vector table
          MOVEQ   #-1,D1                 ; flag: current job ID
          MOVEQ   #MT_TRAPV,D0           ; tell QDOS which manager function
          TRAP    #1                     ; do a manager QDOS call
          RTS                            ; return to SuperBASIC
SET_UP:   MOVE.L  (A0)+,(A1)+            ; copy source to destination and increment pointers
          DBRA    D0,SET_UP              ; loop until all done
          RTR                            ; return to caller
TRAP_TAB: DS.L 19                        ; 19 long word entries
```

this do-it-yourself bug fixing? The system call to QDOS to redefine the *Trap* vectors is *Trap #1* with *DO* holding *7*, *D1* holding the job *ID* (which, for the SuperBasic command interpreter, would be -1) and *A1* pointing to the new vector table.

Listing 1 shows a 68008 assembly language program to set up a new vector table with the same contents as the old one, except for the non-maskable interrupt entry which I have redefined to point to the 'cold-reset' routine (the one which the 68008 executes upon power-up or pressing of the reset button). This, I agree, is not much use as it stands but merely illustrates the point of this article and proves to readers that the potential for great things is there!

Listing 2 is for those of you who have no access to an assembler and wish to enter the code using a Basic loader. This will pose no problem as the code is short.

Table Two

(1) Address error
(2) Illegal instruction.
(3) Divide by zero.
(4) Chk.
(5) Trapv
(6) Privilege violation.
(7) Trace.
(8) Interrupt level 7 (non maskable)
(9) to (19) Trap #06 to Tap #0F

```
100 LET reserved_address=RESPR(512)
110 FOR data_item_number=1 TO 54
120   READ data_item
130   POKE reserved_address+data_item_number-1,data_item
140 END FOR data_item_number
150 CALL reserved_address
160 :
170 DATA 65,248,0,12,67,250,0,48,112,7,97,34,67,250,0,68,34,188,0,0,1,
    104,65,248,0,138,67,250,0,58,112,11,97,12,67,250,0,18,114,255,112,
    7,78,65,78,117,34,216,81,200,255,252,78,117
```

Listing 2: The SuperBASIC program.

Off at a tangent

Try this implementation of Logo for the BBC B written by T N Richardson

This program is a very simple introduction to a few simple commands in the language called Logo. The program has been designed in such a way that it is fairly easy to add your own commands at leisure. The present commands are only the tip of the Logo iceberg, but they clearly show what a simple program can do.

Each command must be followed by the *Return* key, on which a Prompt will appear in the box at the bottom left of the screen asking *'how far?, 'how many degrees?'*. Simply type in the required number and the turtle should move on the large graphics area.

The commands available are listed in the bottom right-hand box on the screen. Full instructions are included in the program.

Program Notes

Line No	
10-20	Title & instructions if required
30-50	Sets break key to re-run program when pressed. Bleeps when error (escape) occurs
60	Makes block appear in front of cursor
130-150	Sets up variables & windows. Puts turtle on to screen
160-240	Loop which waits for input
260-320	Window drawing procedure
340-410	Turtle drawing procedure
420-760	Movement procedures
770-830	Commands to be printed
840-1010	Instructions
1020-1060	Double height printing routine

```
  10 MODE7
  20 PROCinstruct
  30 MODE0
  40 *KEY10 D.|M RUN|M
  50 ON ERROR VDU7
  60 VDU23;106;0;0;0;
  70REM **************************
  80REM *** SIMPLE   LOGO      ***
  90REM *** VERSION  - 1.04    ***
 100REM *** by T.N.RICHARDSON ***
 110REM *** (C)copyright 1985 ***
 120REM **************************
 130 PROCvars
 140PROCwindows
 150PROCturtle
 160 INPUT"Command :"T$
 170 IF T$="RIGHT" THEN PROCright
 180 IF T$="FORWARD" THEN PROCforw
ard
 190 IF T$="LEFT" THEN PROCleft
 200 IF T$="PENDOWN" THEN D%=1:VDU
7
 210 IF T$="PENUP" THEN D%=0:VDU7
 220 IF T$="CENTRE" THEN VDU7:PROC
turtle:TX%=500:TY%=500:ANG=0:PROCtu
rtle
 230 IF T$="BACK" THEN PROCbackwar
ds
 240 IF T$="EXIT" THEN VDU22,7:END
 250 GOTO160
 260DEF PROCwindows
 270 GCOL0,131:CLG
 280 VDU24,50;250;1200;1000;:GCOL0
,128:CLG
 290 VDU28,40,30,77,25:COLOUR128:C
LS
 300 PROCcommands
 310VDU28,1,30,37,25:COLOUR128:CLS
 320 ENDPROC
 330
 340DEF PROCturtle
 350 GCOL3,3
 360VDU29,TX%;TY%;
 370MOVE SIN(RAD(ANG))*100,COS(RAD
(ANG))*100
 380DRAW SIN(RAD(ANG+160))*100,COS
(RAD(ANG+160))*100
 390DRAW SIN(RAD(ANG-160))*100,COS
(RAD(ANG-160))*100
 400DRAW SIN(RAD(ANG))*100,COS(RAD
(ANG))*100
 410ENDPROC
 420DEF PROCright
 430INPUT"Number of degreee:"D
 440 PROCturtle
 450 ANG=ANG+D:PROCturtle
 460 ENDPROC
 470DEF PROCvars
 480TX%=500:TY%=500
 490ANG=0
 500 D%=0
 510
 520ENDPROC
 530DEF PROCforward
 540 INPUT "How far :"F
 550PROCturtle
 560 GCOL0,1
 570MOVE0,0
 580 IF D%=1 THEN DRAW SIN(RAD(ANG
))*F,COS(RAD(ANG))*F ELSE MOVE SIN(
RAD(ANG))*F,COS(RAD(ANG))*F
 590 TX%=TX%+SIN(RAD(ANG))*F:TY%=T
Y%+COS(RAD(ANG))*F
 600 PROCturtle
 610 ENDPROC
 620DEF PROCleft
 630INPUT"Number of degrees:"D
 640PROCturtle
 650ANG=ANG-D:PROCturtle
 660ENDPROC
 670DEF PROCbackwards
 680INPUT "How far :"F
 690PROCturtle
 700GCOL0,0
 710MOVE0,0
 720DRAW SIN(RAD(ANG-180))*F,COS(R
AD(ANG-180))*F
 730TX%=TX%+SIN(RAD(ANG-180))*F:TY
%=TY%+COS(RAD(ANG-180))*F
 740PROCturtle
```

```
  750GCOL0,1
  760ENDPROC
  770DEF PROCcommands
  780 CLS:PRINT"COMMAND TABLE :-COM
MAND+<RETURN>"
  790PRINT'"LEFT        RIGHT      CE
NTRE"
  800PRINT "FORWARD     BACK       EX
IT"
  810PRINT "PENUP       PENDOWN"
  820 ENDPROC
  830
  840DEF PROCinstruct
  850PROCdouble(2,2,"SIMPLE LOGO")
  860PROCdouble(2,6,"VERSION 1.04")

  870 PROCdouble(0,10,"(C)copyright
 1985")
  880PROCdouble(0,14,"By Tony.N.Ric
hardson")
  890PRINTTAB(2,18);"INSTRUCTIONS(Y
/N)";
  900INPUT INS$
  910IF INS$="N" THEN ENDPROC
  920CLS
  930PROCdouble(2,2,"SIMPLE LOGO")
  940PRINTTAB(2,6);"All commands mu
st be followed by"
  950PRINTTAB(2,7);"RETURN,and a pr
ompt will appear,"
  960PRINTTAB(2,8);"asking you,how
far or how many"
  970PRINTTAB(2,9);"degrees.The com
mands are in a table"
  980PRINTTAB(2,10);"at the bottom
right of the screen."
  990PROCdouble(2,16,"PRESS A KEY T
O START")
 1000P=GET
 1010ENDPROC
 1020
 1030DEF PROCdouble(X,Y,A$)
 1040PRINTTAB(X,Y);CHR$134;CHR$141;
A$
 1050PRINTTAB(X,Y+1);CHR$132;CHR$14
1;A$
 1060ENDPROC
```

Life in the fast lane

Fast saving and loading on the CPC464 brought to you by ***Brian Cadge***

The CPC's cassette system is designed to save and load programs at a variety of speeds, two are available in Basic, 1000 and 2000 baud. However, even at the faster of the two speeds, saving a screen dump to tape takes nearly two minutes. This is mainly because all cassette data is written out, and read back in blocks of 2048 bytes long. Between each block there is an interblock gap and header of about five seconds. This is there to allow Basic to perform operations on the data read in (especially on text files). On long files of continuous data, such as screen dumps, these gaps simply waste time.

The program presented here adds two new RSX commands to Basic. These are |*FSave* and |*FLoad*. They allow screen dumps (or any other block of data from memory), to be saved as one continuous block at the fastest safest speed of 2200 baud. This speeds up loading times dramatically; for example, the screen dump now saves and loads at twice the speed of the normal 2000 baud save/load commands. For longer sections of data the saving is even better.

The commands support filenames of up to 20 characters long and upper/lower case is significant. The syntax of the commands are as follows. The *FSave* command is followed by the filename string, and optionally the start and length of the data. If only the filename is given, as in the following, *f$="Picture-1":|FSave,@f$*, then the program assumes that a screen dump is to be saved, and the data saved starts at 49152 and is 16384 bytes long.

You can save any other block of data by using the full format of the command as follows, *f$="Data File-1":|FSave,@f$,30000,5000*, the memory starting at address 30000 will be saved for 5000 bytes. A 30 byte header is saved before the data block, this contains the filename, start and length values. There will be no prompts to *'Press Play'*, etc, with these new commands. Pressing *Esc* will report an Input/Output error, as will faulty tape loads.

The |*FLoad* command has three formats. In its simplest form, |*FLoad* on its own will load in the first |*FSaved* file it finds, regardless of filename. The following messages are output by the |*FLoad* command, *"Searching . ."* means that |*FLoad* is still waiting to find an *FSaved* file.

"Found filename" means that |*FLoad* has found the file 'filename' but this does not match the filename given, so it is being skipped over, and *"Loading filename"* means that the file is being loaded.

The second format of the |*FLoad* command is to follow it by the specific filename to be loaded, as in, *f$="Picture-1":|FLoad,@£$* any file encountered before *"Picture-1"* will be skipped over. Finally, the third format of the |*FLoad* command is to add an optional '1' to the end as in, *f$="Picture-1":|FLoad,@f$,1*. This tells the program not to print any messages, although Error messages are always printed. This last option is useful from within programs to stop a screen display being disturbed. It is logically similar to adding an '|' as the first character of a standard filename.

As different sync characters are used in the headers of the header and data blocks, the normal CPC cassette commands *Load/Save/Cat*, etc, will not recognise *FSaved* files and will skip over them, and similarly, |*FLoad* will not recognise files saved by the normal CPC commands and will skip over them.

To use the program, type in and save the Basic Loader program, taking care, as always, with the data statements. Once this has been *Run* successfully it can be *Newed* and the two new commands will be available until the machine is Reset or turned off. Of course, it is not worth loading in the new commands if you only intend to save small amounts of data, but for a program, such as a screen designer where screens are to be saved and loaded frequently, the time saved is well worth the effort of typing in the program.

```
;
; Fast Load and Save for CPC's
;
        ORG  40001
        LD   BC,CMDTAB
        LD   HL,OSBUF
        CALL &BCD1
        RET
CMDTAB: DEFW CMDS
        JP   SAVE
        JP   LOAD
CMDS:   DEFM "FSAV"
        DEFB "E"+128
        DEFM "FLOA"
        DEFB "D"+128
        DEFB 0
GETNAM: LD   L,(IX+0)
        LD   H,(IX+1)
        LD   B,(HL)
        INC  HL
        LD   E,(HL)
        INC  HL
        LD   D,(HL)
        PUSH BC
        LD   HL,FNAME
        LD   B,20
BLKNAM: LD   (HL),32
        INC  HL
        DJNZ BLKNAM
        POP  BC
        LD   A,B
        OR   A
        RET  Z
        CP   21
        JR   C,LENOK
        LD   A,20
LENOK:  LD   B,A
        LD   HL,FNAME
COPNAM: LD   A,(DE)
        LD   (HL),A
        INC  DE
        INC  HL
        DJNZ COPNAM
        RET
SETFSP  LD   HL,165
        LD   A,38
        CALL &BC68
        RET
OUTMES: LD   A,(HL)
        OR   A
        RET  Z
        CALL &BB5A
        INC  HL
        JR   OUTMES
SAVE:   CP   1
        JR   Z,SAVSCN
        CP   3
        JP   NZ,SERR
        LD   L,(IX+0)
        LD   H,(IX+1)
        LD   (LENG),HL
        LD   L,(IX+2)
        LD   H,(IX+3)
        LD   (START),HL
        INC  IX
        INC  IX
        INC  IX
        INC  IX
        JR   SAVCOD
SAVSCN  LD   HL,49152
        LD   (START),HL
        LD   HL,16384
        LD   (LENG),HL
SAVCOD: CALL GETNAM
        CALL SETFSP
        LD   HL,FNAME
        LD   DE,30
        LD   A,0
        CALL &BC9E
        JP   NC,IOERR
        LD   HL,(START)
        LD   DE,(LENG)
        LD   A,255
        CALL &BC9E
        JR   NC,IOERR
        CALL &BC65
        RET
LOAD:   CP   1
        JR   Z,PARON
        CP   2
        JR   NZ,NOPAR
        LD   A,0
        LD   (NOISY),A
        INC  IX
        INC  IX
        JR   LOAD2
PARON:  LD   A,255
        LD   (NOISY),A
        JR   LOAD2
NOPAR   CP   0
        JR   NZ,ERROR
        LD   A,128
        LD   (NOISY),A
LOAD2:  CALL GETNAM
        CALL SERMS
LOOK:   LD   HL,FNAME2
        LD   DE,30
        LD   A,0
        CALL &BCA1
        JR   NC,IOERR
        CALL PRFNAM
        LD   A,(NOISY)
        CP   128
        JR   Z,SAME
        LD   HL,FNAME
        LD   DE,FNAME2
        LD   B,20
CMP:    LD   A,(DE)
        CP   (HL)
        JR   NZ,NOTSAM
        INC  DE
        INC  HL
        DJNZ CMP
SAME:   CALL PRLDMS
        LD   HL,(START2)
        LD   DE,(LENG2)
        LD   A,255
        CALL &BCA1
        JR   NC,IOERR
        RET
NOTSAM  LD   A,(NOISY)
        OR   A
        JR   Z,LOOK
        LD   HL,CRLF
        CALL OUTMES
        JR   LOOK
ERROR:  LD   HL,MESS0
        CALL OUTMES
        RET
IOERR:  LD   HL,MESS4
        CALL OUTMES
        RET
SERMS:  LD   HL,MESS1
        LD   A,(NOISY)
        OR   A
        RET  Z
        CALL OUTMES
        RET
```

```
1490 PRFNAM  LD   HL,MES02          1630         CALL OUTMES          1770 MES08   DEFS 10,10
1500         LD   A,(NOISY)         1640         RET                  1780         DEFM "I/O Error reported"
1510         OR   A                 1650 ; Message strings start here  1790         DEFB 13,10,0
1520         RET  Z                 1660 MES01   DEFB 13,10           1800 ; Header block one starts here
1530         CALL OUTMES            1670         DEFM "Searching..."  1810 FNAME   DEFS 32
1540         LD   A,0               1680         DEFB 13,10,0         1820 START   DEFS 2
1550         LD   (FNAME2+20),A     1690 MES02   DEFM "Found"         1830 LENG    DEFS 2
1560         LD   HL,FNAME2         1700         DEFB 32,32,32,32,0   1840 DOBUF:  DEFB 4
1570         CALL OUTMES            1710 MES03:  DEFB 10              1850 NOISY:  DEFB 1
1580         RET                    1720         DEFM "Loading"       1860 ; Header block two starts here
1590 PRLDMS: LD   HL,MES05          1730         DEFB 32,32,0         1870 FNAME2  DEFS 22
1600         LD   A,(NOISY)         1740 CRLF:   DEFB 13,10,0         1880 START2  DEFS 2
1610         OR   A                 1750 MES03:  DEFM "Syntax error in command"  1890 LENG2:  DEFS 2
1620         RET  Z                 1760         DEFB 13,10,0
```

```
10 ' Fast Load/Save - Basic Loader
20 MEMORY 42000
30 FOR i=42001 TO 42440
40 READ a$:v=VAL("&"+a$)
50 cs=cs+v:POKE i,v
60 NEXT i
70 IF cs<>49067 THEN PRINT"DATA ERROR - Check listing";CHR$(7):STOP
80 CALL 42001
90 CLS:PRINT"#FLOAD and #FSAVE commands loaded"
100 END
110 DATA 01,1B,A4,21,E3,A5,CD,D1,BC,C9,23,A4,C3,6B,A4,C3,C2,A4,46,53,41,56
120 DATA C5,46,4C,4F,41,C4,00,DD,6E,00,DD,66,01,46,23,5E,23,56,C5,21,C9,A5
130 DATA 06,14,36,20,23,10,F8,C1,78,87,C8,FE,15,38,02,3E,14,47,21,C9,A5,1A
140 DATA 77,13,23,10,FA,C9,21,91,00,3E,3A,CD,68,BC,C9,7E,87,C8,CD,5A,BB,23
150 DATA 18,F7,FE,01,28,21,FE,03,C2,32,A5,DD,6E,00,DD,66,01,22,E1,A5,DD,6E
160 DATA 02,DD,66,03,22,DF,A5,DD,23,DD,23,DD,23,DD,23,18,0C,21,00,C0,22,DF
170 DATA A5,21,00,40,22,E1,A5,CD,2E,A4,CD,59,A4,21,C9,A5,11,1E,00,3E,00,CD
180 DATA 9E,BC,D2,39,A5,2A,DF,A5,ED,5B,E1,A5,3E,FF,CD,9E,BC,30,78,CD,65,BC
190 DATA C9,FE,01,28,0F,FE,02,20,12,3E,00,32,E7,A5,DD,23,DD,23,18,10,3E,FF
200 DATA 32,E7,A5,18,09,FE,00,20,52,3E,80,32,E7,A5,CD,2E,A4,CD,40,A5,21,E8
210 DATA A5,11,1E,00,3E,00,CD,A1,BC,30,41,CD,4C,A5,3A,E7,A5,FE,80,28,10,21
220 DATA C9,A5,11,E8,A5,06,14,1A,BE,20,16,13,23,10,F8,CD,63,A5,2A,FE,A5,ED
230 DATA 5B,00,A6,3E,FF,CD,A1,BC,30,16,C9,3A,E7,A5,87,28,C1,21,95,A5,CD,62
240 DATA A4,18,89,21,98,A5,CD,62,A4,C9,21,B2,A5,CD,62,A4,C9,21,6F,A5,3A,E7
250 DATA A5,87,C8,CD,62,A4,C9,21,80,A5,34,E7,A5,87,C8,CD,62,A4,3E,00,32,FC
260 DATA A5,21,E8,A5,CD,62,A4,C9,21,8A,A5,3A,E7,A5,B7,C8,CD,62,A4,C9,0D,0A
270 DATA 53,65,61,72,63,68,69,6E,67,2E,2E,2E,0D,0A,00,46,6F,75,6E,64,3A,20
280 DATA 20,20,00,0D,4C,6F,61,64,69,6E,67,3A,20,00,0D,0A,00,53,79,6E,74,61
290 DATA 78,20,65,72,72,6F,72,20,69,6E,20,63,6F,6D,6D,61,6E,64,0D,0A,00,0D
300 DATA 0A,49,2F,4F,20,45,72,72,6F,72,20,72,65,70,6F,72,74,65,64,0D,0A,00
```

Go Forth

Random disc access with Forth users in mind on the CBM 64 by ***Adrian Warman***

The following article and program details an introduction to the techniques of random access to disc storage. By way of a concrete example, we will consider here the way in which a well-known language package behaves in its disc storage, and hence use this to demonstrate how any disc drive owner can inspect the contents of any disc sector.

For most computer owners, the choice of languages available, other than Basic, will almost always include Forth. Forth is beginning to enjoy increasing popularity as programmers find out about its extremely powerful and very fast operation.

Spectrum owners (and more recently, CBM owners) will be aware of an excellent implementation of Fig-Forth (one of the most common Forth standards on micros) called *White Lightning*. I do not propose to mention much about the package, since it has been reviewed elsewhere, but it is much like most other Forths in that it uses 'screens' to store its program listing.

A Forth screen is simply a work area consisting of 16 lines of 64 characters, on to which Forth words are placed in meaningful order. The lines are numbered from 0 to 15. If you consider a Basic program listing, divide it into groups of 16 lines (making sure that no line is longer than 64 characters), then you have just envisaged what a Forth screen looks like. Each screen has a number from 1 to an upper limit, for White Lightning this is 12 screens for the tape-based version (which must keep all screens in memory), and 88 screens for the disc-based version.

In most versions of Forth, screens being used are stored in memory buffers called Blocks. These are 1024 characters long (16 × 64!), and in theory equate to disc storage. In other words, whenever any disc access is made by the Forth system, it is always in the basic unit of the block — you can only read or write whole blocks. However, because most micro-computers do not have discs with sectors that can hold more than 256 characters. Fig-Forth defines a variable called *B/Scr*. This is the number of disc blocks (or sectors) that make up on 1024 character screen.

So, what relevance does this have to 1541 disc drive owners? Simply that each Forth screen consists of four blocks of 256 characters, which are exactly equivalent to disc sectors. The program given in this article is intended to let users access Forth screens using normal Basic. However since the principle involved is simply to read sectors and display them character by character, it should be apparent how easy it is to modify the program to consider individual sectors, and display their contents in a more useful form, for example, examining the contents of the directory track (track 18).

As it stands, the program will list four blocks at a time, since that is how each Forth screen is made up. Forth screens can only consist of printable ASCII characters, so there is no problem with 'funny' control codes. However, if you did indeed wish to alter the program to portray such codes, it is simply a matter of adding code after line 1430 to replace non-printable characters by (say) a '!' symbol. For further information on this, see the program notes.

In order to understand the program, it is necessary to look at how the 1541 works to allow random accessing of disc sectors. The 1541 has a small amount of workspace Ram (about 2K) used for system variables and also a number of 256 byte buffers used for transferring data to and from the computer. Any reading or writing of sectors is performed by copying the entire contents of the sector to or from one of these buffers. At the same time, a counter is kept of exactly how many bytes within the buffer are valid data. When the user attempts to read beyond this value, an end-of-file error occurs, which sets the Basic variable ST(atus) to 64.

In order to access individual sectors, we must have two channels of information flow from computer to disc. The first is the command channel, which is number 15 as usual. The second channel is to access the data from one of the 256 byte buffers. To show that we wish to access one of these buffers, we use a filename of "#" (see Line 1130). The drive will automatically assign one of the buffers to this channel. We can then use the command channel to instruct the drive to read-into or write-from this buffer.

To read data from a sector, we use the command channel to send the command:

"BLOCK-READ:",channel,drive;track,sector

We can now access the data channel just as if it was a normal sequential file, but a maximum of 256 characters long. The counter stored along with the sector will prevent us from reading too much data.

However, there may be occasions when we wish to read *all* the characters in a sector. We can do this by sending a command.

"U1:",channel;drive,track,sector.

This behaves in exactly the same way as the Block-Read, but having copied the sector into the buffer, it then forces the byte counter to indicate that all bytes within the buffer are valid. We can then read every byte without hitting an end-of file error.

Program Notes
Line No

1000-1100- These lines set up the screen to make it easier to read. Some constants are defined to make it easier to read the program listing. The program will pause until *Return* is pressed when it will be allowed to access the drive.

1120-1130- Open the command channel to drive, and a data channel to any one of the data buffers. The order of the open commands is important, since if the data channel is opened before the command channel, the act of opening the command channel will deallocate the data channel, and any attempt to access the data channel would then result in a *"No Channel"* error message.

1150-1190- This program is a utility to list sectors to the screen or the printer. These lines inquire whether the printer is required. The peculiar expression in Line 1180 simply means that *PR* will be true if the printer is needed (ie, if the user replied 'Yes'), and false otherwise. If the printer is required, an output file is opened to device four. If you have another device (eg, plotter) or a parallel printer connected, you may need to alter that line slightly.

1220-1270- This program is written to access White Lightning Forth screens, which are labelled in the range 1 to 88 inclusive. These lines inquire which screens are to be displayed.

1300- The main program loop to print out each screen in turn.

1310-1320- Print out a heading of the screen to follow. If the printer is selected, the same message will appear there.

1330- As mentioned above, each Forth screen line is numbered from 0 to 15. *RNUM%* is an integer variable which will keep track of the line number currently being output.

1340-1360- The 256 character size of 1541 disc sectors means that four sectors or blocks make up one screen. These lines perform two conversions. The first is the loop in Line 1340 which calculates the physical blocks which make up screen *Scr*. For example, screen number one uses disc blocks 1*4=4 to 1*4+3=7 inclusive, similarly screen 25 would use blocks 25*4=1000 to 25*4+3=103 inclusive. The second conversion is to take this block number and convert it into the correct track and sector numbers. By some quick arithmetic, you should see that the screen 88 will use block 355 as its final block, and by coincidence, this corresponds to the last sector of track 17. Tracks one to 17 inclusive each have 21

sectors on them, and so the conversion to track and sector is performed by simple integer divisions in Lines 1350 and 1360 To make this program more general, the indexing method to blocks may need to be generalised.

1380- This reads in the sector on *Trk%* and *Sec%*. Because the *'U1'* command was used, the byte counter is set to maximum

1390- Each disc sector can hold 256/64=4 Forth screen lines. This line will force a loop of four times to read in each of the four screen lines

1400-1460- These lines will read in each of the Forth screen lines *Line$* holds each of the characters to be printed, and is built up as each character is read from the buffer. *Last%* keeps track of the last non-space character on the line This is to keep the string output as short as possible Since each screen line is 64 characters wide, this exceeds the width of the 64 screen, and so will cause a wrap around. By trimming the string, this effect is reduced Note how the data channel is read (Line 1430) in an identical fashion to as ordinary sequential file *Get#* is used rather than *Input#* because it is more general purpose, and although it is slower, it will successfully read characters such a ',' or ':', unlike *Input#*

1480-1510- These lines will print out the trimmed string of characters read from the disc sector, prefixed with the line number stored in *Rnum%*. The program then repeats for the next 'row' of the block.

1520- Having finished this block, go and read the next block of the screen

1540- If the printer is being used for output, a few blank lines are added to make the listing clearer

1550- One complete Forth screen of four blocks has been output. If there are more to get, go and do so

1580-1600- The output is completed now, so close the various files in the reverse order to which they were opened. It is important to note that the command channel should always be the first to be opened, and the last to be closed. Failing to do this (especially with writing sequential files) could result in premature (and so incorrect) closure of files – leading to big problems later

```
1000 rem forth screen read.
1010 :
1020 poke 53280,0
1030 poke 53281,0
1040 cr$=chr$(13)
1050 cs$=chr$(147)
1060 print cs$;chr$(14);chr$(30)
1070 print "Ensure that the Source
Disk is in"
1080 print "Drive 0 and press
<RETURN>."
1090 get rep$
1100 if rep$<>cr$ then goto 1090
1110 :
1120 open 15,8,15,"i0"
1130 open 2,8,2,"#"
1140 :
1150 print cr$;"To Printer? (Y/N)"
1160 get rep$
1170 if (rep$<>"y") and (rep$<>"n")
then goto 1160
1180 pr=(rep$="y")
1190 if pr then open 4,4
1200 :
1210 :
1220 print cs$
1230 input "From which screen";s1%
1240 if (s1%<1) or (s1%>88) then
goto 1220
1250 print cs$;"From screen:";s1%
1260 input "  To screen";s2%
1270 if (s2%<1) or (s2%>88) then
goto 1250
1280 :
1290 :
1300 for scr=s1% to s2%
1310  print cs$;"Screen";str$(scr);
"."; cr$
1320  if pr then print#4,"Screen";
str$(scr);".";cr$
1330  rnum%=0
1340  for blks=scr*4 to scr*4+3
1350   trk%=int(blks/21)+1
1360   sec%=blks-int(blks/21)*21
1370   :
1380   print#15,"u1:";2;0;trk%;sec%
1390   for row=1 to 4
1400    lin$=
1410    last%=0
1420    for col=0 to 63
1430     get#2,sym$
1440     lin$=lin$+sym$
1450     if sym$<>" " then last%=col
1460    next col
1470    :
1480    print right$(str$(rnum%),2);
" ";left$(lin$,last%+1)
1490    if pr then print#4,right$
(str$(rnum%),2);" ";chr$(93);lin$;
chr$(91)
1500    rnum%=rnum%+1
1510   next row
1520  next blks
1530  :
1540  if pr then print#4,cr$;cr$;cr$
1550 next scr
1560 :
1570 :
1580 if pr then close 4
1590 close 2
1600 close 15
1610 :
1620 print cs$;"Job Done."
1630 end
```



Fast Nasty

I'm pleased to be getting more letters from Dragon owners these days and here is one from Neil Kenny of Crewe that I'm sure many people will find invaluable. "I picked this tip up off the Software Projects stand at the 6809 show. *Cloadm Manic Miner* as usual and press *Enter* to start, press P for pause and if you now type the word PENGUIN a boot should appear at the bottom right of the screen. To get onto any screen press break then any letter A-V the letters correspond to one of the screens in order, screen T being the Final Barrier, U being the Dragon User's bonus and V being The End. To speed up your journey in Eugene's Lair you can get the key below the one at top right of the screen by following this routine from the screen start – jump over Ice, jump over gap, jump over bush, get top key, walk onto conveyor ball, jump right back on to platform. You will pick up the second key on the return jump so there is no need to take the long route on the bottom of the screen.

"At the show I purchased *Jetset Willy* and mapped it the next day as having 73 screens rather than the Spectrum's 60 plus three entrance to Hades caverns."

Neil continues, "To get everlasting lives on *Bug Diver* by Mastertronic follow loading instructions until it displays the playing rules. Press *Break* (the game is a mixture of Basic and machine code) and delete line 17. Run the game.

"Here are my high scores – *Time Bandit* 29170, *Speed Racer* 3 tracks, *Chuckie Egg* 163210, *Ice Castles* 537793, *The King* 59720, *Hungry Horace* 3126519 and six lives remaining, *Racer Ball* 161219, *Manic Miner* 29560, *Backtrack* (test 1) 59 seconds. I can recommend all the above games, especially JSW."

Sticking with the same game for a while I've had a couple of letters about the Amstrad version. A mysterious inhabitant of Durham called P F The Tetrarch has sent me a map of the 109 rooms found to date and wants to know whether anyone has a poke routine for immunity from falling and what the switch does in 'The Trip Switch'. The answer comes from Murray Pope who has used our infinite lives poke to produce a similar map, although once again it isn't of all the rooms. He provides some tips on how to complete some of the trickier problems including Decapiture. "To pass Decapiture you must get past the doohickey on the left, if you don't make this the chances are you will keep on dying. Then you must fall down between the pillars on the guillotine and keep to the left until it's safe to jump to the right. Clear? Oh well.

"On 'The Hole With No Name' the exit on the right is difficult to find but can be seen as an irregular patch of red-on-yellow, two thirds of the way up the right hand wall. You must go through this exit and along the 'secret passage' to collect the three objects on the left of the screen. Don't go down 'T' Pit' – you will never get out. Be prepared for a shock if you climb the 'Cold Store' rope – the sewer above has a very fast nasty flying around. 'The Trip Switch' makes the 'Cartography Room' possible. Beware of 'Loony Jet Set' – strange things happen here. Don't be too frightened by all the monsters in 'Eggoids' the screen is really quite easy to pass.

Unlike the Spectrum version it is (I think) possible to go back down the 'East Wall' from the 'Emergency Generator'. On the 'Yacht' follow the saw very closely and turn back the instant you collect the object, otherwise the mega-death. The simplest way to get from right to left through the 'Kitchen' and 'West Kitchen' is to just hit the left button and keep walking, – the timing allows you through without stopping. Don't die in the 'Forgotten Abbey' – it is notorious for multiple deaths. On 'Main Lift 2' and 'Main Lift 1' keep as far right on the lift as you can and you'll escape the arrows just!" Thanks for that, Murray – we can add it to the growing pile of invaluable tips you have sent.

I've got a lot of letters here that for some reason or another did not get put into the pokes special issue, which I trust you all enjoyed, and over the next few weeks I will try to fit them all in the column. However, I have to repeat the point made that we had so many replies it has been physically impossible to check each one.

Another old friend of the column is Kenneth Devlin of Inverkip in Scotland who is single handedly responsible for most of the pokes we get for the Commodore – here is a crop of excellent routines from him. "One reason for the lack of Pokes for the Commodore 64 is that most programs are turbo loaded to get around the slow cassette interface. This makes the whole business of entering a single poke for infinite lives that much harder.

"A system I use a lot when hacking is to touch pins 6 and 2 of the serial port together – this resets the machine without affecting the machine code, but be careful as getting it wrong could damage the machine.

"*Falcon Patrol* – you can poke the lives location (16705) with a number greater than three but when you play each time you crash your score is reset to zero. To get round this I have set lives to '2' and disabled the code that subtracts the life. When playing the first time after loading the first plane explodes following fueling – don't worry, it shouldn't happen again. To obtain infinite lives – *Load* "",1,1 / *Load* "",1,1 / *Poke* 16764,234 / *Poke* 16765,234 / *Poke* 16705,2 / SYS 16640 /.

"*Kokotoni Wilf* – *Load* "",1,1 / 30 FOR B=0 TO 12 *Read A. Poke* (684+B),A. *Next* B: SYS 680 / 40 *Data* 159, 234, 162, 3, 157, 11, 67, 202, 208, 250, 78, 140, 166 / *Run* /

"*Automania* – *Load* "",1,1 / *Poke* 2212,134 / *Poke* 2213,0 / *Poke* 2242,169 / *Poke* 2243,238 / *Poke* 2244, 141 / *Poke* 2245,137 / *Poke* 2246,67 / *Poke* 2247,76 / *Poke* 2248,241 / *Poke* 289,8/ *Run* /.

"*Beamrider* (ignore load error for second part) – *Load* "",1,1 /*Load* "",1,1 /*Poke* 4226,234 / *Poke* 4227,234 / *Poke* 4228,234 / *Poke* 35909,88 / *Poke* 35910,242 / *Poke* 35911,26 / *Run* /

"*Fred* – load as normal and reset machine – *Poke* 28209,234 / *Poke* 28210,234 / *Poke* 30400, X (x-no. of bullets eg. 99) / Sys 30483 / "

Tony Kendle

We are searching for the top UK computer games player – the best there is!

The very best of Britain's game players will get to fight it out on a number of top secret new games – scheduled for release in the autumn.

Here's how it works

Study the table below and look at the column for the machine you have – these are the games you'll need to master. Send your high scores in on the form below, making sure that your scores are authenticated by a responsible individual signing the form. Any ones achieved using technical short-cuts – such as infinite lives Pokes – will not be accepted.

Between now and September Tony Kendle will be keeping you up to date on the *Arcade Avenue* page with just who has the scores to beat. Then, in September, the top three scores on each machine will battle it out for a place in the final and the chance to be the first to play the top secret games.

	Commodore	BBC	Spectrum	Amstrad
Game 1	Suicide Express	Elite	Technician Ted	Sorcery
Game 2	Beach Head	Jet Pac	3D Star Strike	Splat!
Game 3	Shoot the Rapids	Chuckie Egg	Cyclone	Manic Miner

Game Wizard Entry Form

Micro . . .

Game 1 score . . .

Game 2 score . . .

Game 3 score . . .

Name

Address . . .

. . .

. . .

Your signature . . .

Witness's signature . . .

. . .

System 3 Software

NEW!!

RED MOON MoonQuest fantasy adventure for most micros. The Moon Crystal of X[illegible] supplied good magik for the honest rulers of the kingdom of Baskalos. Then it was stolen and the land fell into chaos. You must recover the Moon Crystal from the magik-rich castle where it is hidden, armed only with your wits and spells.

RED MOON‡ is a Level 9 adventure with over 200 locations. Amstrad, BBC, Commodore 64, MSX and Spectrum versions have 150+ pictures.

RED MOON is available now on cassette at *£6.95*. It joins Level 9's catalogue of acclaimed adventures for:

AMSTRAD cpc464

ATARI 48k

BBC 32k

COMMODORE 64

ENTERPRISE 64

MEMOTECH 500/512

MSX 64k

SPECTRUM 48k

Here's what some reviewers have recently said about Level 9:

"The series of adventures which has (since) flowed from Level 9 is renowned for high standards of plot and literate description"
-Sinclair User, May 1985

"I'll be kept more than busy by the absorbing Level 9 adventures"
-MSX User, June 1985

"If only more adventure houses could achieve Level 9"
-Crash, May 1985

So don't forget our other great adventures:

COLOSSAL ADVENTURE*† *(cass £9.95)* The classic mainframe game with 70 bonus rooms.

ADVENTURE QUEST*† *(cass £9.95)* "A brilliant adventure that confirms Level 9's place as the ultimate adventure software house" -Computing with the Amstrad, May 1985

DUNGEON ADVENTURE*† *(cass £9.95)* "A wonderful adventure, a world where electricty bills and mortgages have no place" MSX Computing, June 1985

LORDS OF TIME*† *(cass £9.95)* An imaginative romp through world history.

SNOWBALL*† *(cass £9.95)* Immense science fiction game with 7000+ locations.

RETURN TO EDEN*‡ *(cass £9.95)* Popular SF adventure. Amstrad, CBM64, MSX and Spectrum versions have 240 pictures.

EMERALD ISLE‡ *(cass £6.95)* Fantasy adventure. Amstrad, BBC, CBM64, MSX and Spectrum versions have 230 pictures.

ERIK THE VIKING *(cass £9.95)* Game of Terry Jones book for Amstrad, BBC, CBM64 and Spectrum only. All with 180+ pictures.

Red Moon

Level 9 Computing

Level 9 adventures are available from all good computer shops. If you can't find the game you want please ask them to order it.

You can also buy games directly from us. Just send us a cheque made payable to Level 9 Computing, or a postal order. Don't forget to tell us your address, which computer you have and which game you'd like. (Add £1 for each item if outside the UK.)

If you would just like a **FREE FULL COLOUR POSTER**, with more details of Level 9 Adventures on the back, please write to us enclosing a stamped self addressed envelope at least 9" by 6". Write POSTER above our address.

Please write to:

LEVEL 9 COMPUTING
P.O. Box 39
Weston-super-Mare
Avon BS24 9UR

* BBC (Acornsoft dfs)/CBM64 disk versions are now available for those games marked * at £11.95 new or £2.50 upgrade (please return your original cassette)
† Text adventure on all 8 micros
‡ Selected versions have pictures in addition to text

Tony Bridge's Adventure Corner



Join the club

I'm always saying that adventures are becoming a major pastime for computer gamers, and nowhere is this more evident than in the number of helplines and help columns around at the moment

Adventure helplines have had a chequered past – Ken Matthews's phone in service is excellent (and free – call him on Gravesend (0474) 334006) – he also runs a retail outlet and mail-order facility Ken knows more about adventures than just about anyone else, and always comes up with some witty comment. Quite sickening! Another good one is Henry Mueller's Adventurers Club Limited, which also runs a phone-in Helpline, restricted to members of the club But then, they also have an excellent, very useful, monthly newsletter, as well a £10,000 competition under way for the Master Adventurer of the year, plus smaller prizes for the best solutions and maps Call them on 01-794 1261

Unfortunately, others have not been so good, and many people, I believe, have sent off money and received nothing in return I've said it before and I'll repeat it now – because you read about these clubs and helplines in this column does not mean that I personally endorse or encourage them I merely pass on the details that they have sent me After that, it's up to you

Dave Linsley writes to me from Newcastle and his letter is representative of many others I've received, complaining about a certain adventure club/helpline which was advertising some months ago Thankfully, it seems to have disappeared, but many people apparently sent off their £8 in good faith, only to hear nothing more. The directors, as you would expect, explained that they had been snowed under with requests for membership, and this I can believe, but I have yet to hear of anyone receiving the promised goods

Here is news of other clubs opening up

The Adventurer's Guide. Red Free, Bewerly, Harrogate, North Yorkshire HG3 5JE Paul Hawkesworth, who runs the Guide, says "We will not get snowed under, as we have workers and helpers all around the British Isles The membership fee of £3 includes membership card, monthly magazine, 15-25% off games, write or phone-in Helpline We will also, response permitting, be running competitions"

The Quest Line 41, Fernhill Road, Begbroke, Oxford OX5 1RR (Tel 08675 6870). Tony Treadwell, the brains behind this one, says "I send out a newsletter every two weeks, consisting of hints and tips for many adventures The members can swap completed adventures The Quest Line was set up purely as a hobby, and so is completely free"

Adventureline 52 Micawber Way, Newlands Spring, Chelmsford, Essex. I've mentioned this one before, and Roger Garrett el supremo, says "The response has been tremendous, and we can now offer help on many new adventures"

Gary Smart, who has contributed to adventure columns in other magazines, runs a phone-in Helpline on Andover (0264) 59459, and has several helpers on phone numbers around the British Isles, thus helping to keep down your phone bill

Orcsbane: 84, Kendal Road, Hillsborough, Sheffield, Yorkshire S6 4QH this is run by Nick Walkland, whose name has been whispered in hushed tones in this Corner *Orcsbane* is actually a bi-monthly (or so) fanzine for computer adventure gamers, which contains hints'n'tips, reviews, news and so on The first one is out this month at 50p, which also covers postage Nick says "It won't be as serious as some adventure columns, but it will have a chatty light-hearted approach. I will give more information if your readers enclose an SAE – they won't have to send any money without knowing what it is all about" Nick can offer help in a vast range of adventures, including the Zorks, Mysterious, Level 9s, Artics and all the popular new releases. "Please ask your readers to send any adventure-related articles artwork or reviews in exchange for free copies, and general help and their addresses in order to build up a large helpline base"

The best way to ensure that these clubs work is, first of all, for the organisers to make very sure they are set up to handle the mass of enquiries that they will certainly get Particularly if money is involved, the set-up *must* be capable of keeping tabs on a large membership, and keeping everyone happy The second requisite is *participation* on the part of the members – if you want help on an adventure, send details of another game that you have completed, with maps where possible, or even details of your progress so far

A regular correspondent to the Corner is Hugh Walker, of Guildford. You will probably recognise his name if you are a regular reader, and I should have mentioned his sterling cartographic abilities in the piece on *Lords of Time* a little while ago This time he says "Us 'mere mortals' (see the Corner of 20-26 June) are the equal of Beebers in deviousness We too can take a peek at the dictionary of Level 9 games (prior to *Erik the Viking* after which the games are *Break* protected) Here's how

Break and *List* the program, then type *Print* F *Print* C and note the values Now enter the following lines

```
1 For F = 27000 To 35000 Let C = Peek
F Print F, If C < 19 or C < 23 Then Print
Chr$C
2 Print Tab 26,C Next F Stop
```

"If you don't find the dictionary in there, try other limits for Loop F When finished, restore F and C to original values, if any were found, and *Goto* 100 to restart"

Ron Mackenzie also strikes up for the Spectrum adventurers "Here is a program that will list vocabulary It won't work with *Sherlock*, but with *Eureka!*, and others such as the Artic series, should work fine Save the program before you run it by typing *Goto* 90

```
10 Clear Val "24201"
20 Load "" Code Val "24201"
30 For F = Val "24201" To Val "65367"
40 If Peek F < Val "32" Then Goto Val
"70"
50 If Peek F > Val "127" Then Goto Val
"70"
60 Print Chr$ Peek F,
70 Next F
80 Stop
90 Save "CHEAT"
```

To use the progam, *Load* "", *Run* and then play the adventure into it."

Adventure Helpline

Going bananas? If you are stuck in an Adventure with nowhere to turn do not despair – help is at hand

Fill in the coupon explaining your problem send it to us, and a fellow adventurer may be able to help

Remember – the system only works if those adventurers who have solved the puzzles get in touch Every week is Save An Adventurer Today (SAAT) week!

Adventure .... on (Micro) ....
Problem ....
....
Name ....
Address ....
....

CLASSIFIED

Semi-display — £7 per single cc (inc. VAT)
Lineage — 30p per word (inc VAT)

CALL DAVID OSEN on 01-437 4343 FOR SEMI/DISPLAY ADVERTISING

AMSTRAD

Binary Banana

AMSTRAD CPC464

MORE provides 32 [illegible] £5.00

EXPAND [illegible]

[illegible]

BINARY BANANA
PITEC
Park Crescent, Peterborough
Tel Peterborough 312121

SOFT OPTIONS HANDBOOK and Artist of Amstrad (Symodl 464 big letters paint it etc) Swap or sell Ston Tel 593 6622

AMSTRAD CPC464 ADVENTURES
DRAWN FREE! . FREE!

[illegible]

AMSTRAD 3" DISKS

Top quality 3 double side disks only **£38**.95 + p&p

Please add £1 p&p per box. Goods despatched same day first class post. Please send cheques/P O s to:

COMPUMART
71 Gracedelu Road,
Loughborough, Leics.
Tel. (0509) 262259

ACCESSORIES

Self Adhesive Cassette & Disk Labels

[illegible]

INDUSTRIAL PROCESS
[illegible]

BLANK DISKS

10 top quality 5¼" single side double density blank disks. Suitable for 5¼" drives. Boxed with labels etc. Fully guaranteed

only **£9**.95 p&p

Buy 50 and get a 50 capacity perspex storage box **FREE**

only **£49**.95 p&p

Please add £1 p&p per box of 10, £2 p&p per box of 50. Goods despatched same day first class post. Please send cheques/P O s to

COMPUMART
71 Gracedelu Road,
Loughborough Leics
Tel (0509) 262259

BLANK CASSETTES

WITH LIBRARY CASES

	C10	C15	C20	C30
20	3.85	3.85	4.00	4.00
50	14.00	14.15	14.30	14.30
100	25.00	26.00	27.00	27.00

[illegible]

5¼" DS/DD DISKS

10 for £13.80 inc plastic case

QL CENTRONICS PRINTER INTERFACE

only £28 inc P&P
Manufactured by RAM Electronics
[illegible]

EDUCATIONAL SOFTWARE

ATTENTION
Commodore 64 Owners and potential C128 Owners

[illegible]

MJM SOFTWARE (SCOTLAND)
17 Millfield Avenue, Motherwell,
Strathclyde ML1 1HT

HOME ACCOUNTS Put your house in order! Comprehensive coverage of bank accounts credit cards HP etc. Inbuilt accuracy check. Projects cash flow for any period. Available for CBM64 VIC 20 BBC & Electron £8.45. Free details from Discus Software, Freepost, Windmill Hill, Brixham TQ5 9BR Tel 080-45 55532

WANTED

SUNSHINE

Is seeking authors for new titles to add to its highly original and successful book range. Experienced and first time authors are invited to submit manuscript ideas or fields of interest.
Write to: Mark Slade, Book Editor, Sunshine, 12 13 Little Newport Street, London WC2H 7PP

Sunshine Publishers of Popular Computing and Dragon User

MAKE YOUR PROGRAMS MAKE MONEY!

If you have a game, utility or application to sell with a view to publishing (particularly CBM64 or BBC B) phone
JOHN COOK ON
01-437 4343

Volunteer BBC Basic

Programmers needed to help produce educational software for Mentally Handicapped Adults

If you can help contact.

June Stoneham
Kidlington Adult Training Centre
Blenheim Road
Kidlington
Oxford
Oxon

MAGAZINES

commodore HORIZONS

COMMODORE HORIZONS

Special offer! For a limited period only!

[illegible]

Commodore Horizons, Special Code Offer

[illegible]

1. Machine code graphics & sound on C64
2. Artificial intelligence on C64
3. Building with Logo on C64

DRAGON USER

To make the most of your Dragon you need Dragon User — the independent magazine for Dragon owners. To make sure that you receive a copy of Dragon User regularly subscribe direct to us. A year's subscription costs £10 for 12 issues (overseas rates available on application). Send a cheque or postal order made payable to Dragon User and accompanied by your name and address to Dragon User Subscription Department, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH

CLASSIFIED ADVERTISING RATES:

Line by line 30p per word, minimum 20 words

Semi-display £7 per single column centimetre minimum length 2 cm (Please supply A/W as PMT. Or supply rough setting instructions.)

These rates include VAT

Conditions: All copy for Classified section must be pre-paid. Copy date 7 days before publication

If you wish to discuss your ad PLEASE RING David Osen 01-437 4343

Here's my classified ad.

(Please write your copy in capital letters on the lines below)

		Please continue on a separate sheet of paper	

I make this .... words, at .... per word so I owe you £ ....

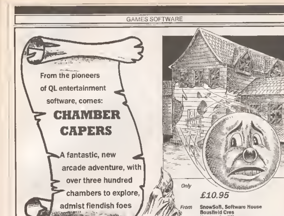
Name ....

Address ....

....

Telephone ....

Please cut out and send this form to: Classified Department, *Popular Computing Weekly*, 12 13 Little Newport Street, London WC2H 7PP



★ HUMPHREY SOFTWARE ★
presents
★ SUPER HANDICAP ★

6 Richard Anderson Court, Monson Road London SE14 5EJ

Spectrum Only £9.95

HALLEY'S COMET numerical simulation for the Spectrum 48K. Shows what to expect to see. Price £6.95. Also programs on electrodynamics rotation gravity relativity. For further information or an order contact: Amima Scientific Computing 23 Crawley Avenue, Hebburn Tyne & Wear. Tel 0632 834996

★ ★ KNIGHT LORE DESIGNER ★ ★
FOR 48K SPECTRUM & SPECTRUM+

CHALLENGE 'MANDY' TO A GAME OF
★ ★ STRIP PONTOON ★ ★
FOR 48K SPECTRUM and SPECTRUM PLUS. AVAILABLE FROM ELECTRON AND AMC B VERSIONS

£2.99
Send your cash cheque/PO to
HIGH SOLTARE
18 Bridge Rd, Park Gate, Hants SO3 7AE

AMSTRAD/ATARI
BEGINNERS ASTROLOGY
Superb graphic display of planetary movements
Tape. £5 inc P&P
To: SAC SOFTWARE
14 Langdown Lawn Close
Hythe Southampton SO4 5GW

SPECIAL OFFER FOR ATARI 400/800/XL OWNERS
Hire first 2 games FREE from our extensive range of software. Latest releases! Apply now! Also: Atari hardware & modems for sale at discount prices.
For further details send SAE to
CHARNWOOD GAMES 27 WARWICK AVENUE, QUORN, LOUGHBOROUGH LEICS
TEL. 0509 412604

SOFTWARE

KWIKLOAD
FOR THE 48K SPECTRUM

Pondle Software
16 Gladstone Road,
Hockley Essex SS5 4BT

UTILITIES

ANY program game transferred onto Microdrive. Send cassette & all documentation/inlays + blank Midrive Cartridge + £1.50. Stone, 8 Boulton Grove, Hull HU9 3ED

SCI TAPE TO MICRODRIVE UTILITY

£4.95 inc p&p

KORRANSOFT Pleasant View Hulme Lane Hulme nr Longton, Stoke-on-Trent Staffs ST3 5BH

CODE SLICER
FOR THE 48K SPECTRUM

Pondle Software
16 Gladstone Road,
Hockley Essex SS5 4BT

PROGRAMMERS! Use any of our exceptional quality character-sets in your programs. 22 to choose from including all popular types such as Sci Fi and Gothic Lettering — New Original Sets. Only £4.99 for 48K Spectrum from K Maddocks, 5 Pinedale, Rainford, Merseyside WA11 8DP

SEVEN STARS COVER THE SPECTRUM

CLNLR-80 £7.95

MODER-80 £8.95

PROFILE £6.95

TASPRO £6.95

Seven Stars Publishing (Dept W), 34 Squirrel Rise, Marlow, Bucks SL7 3PN

USE VTX500 on bulletin boards PSS and Telecom Gold using Spectrum. Other users need Spectrum to operate a modem. File Transfer, control chr$ transfer to tape microdrive etc. £5.95. Version II (Auto send/receive, upper/lower case for Telex, Mail etc) £8.95. Stephen Adams 1 Lesw n Road London N16 [illegible]. Tel. 01 254 1684

Top Secret NEW-NEW-NEW-NEW-NEW Top Secret
HACK ATTACK
48K Spectrum
COMPLETELY NEW SIMPLE TO USE, ALL MACH. CODE, BRILLIANT NEW FOCAL STOP ROUTINES, AND MUCH, MUCH MORE


SERVICES
FAST SPECTRUM AND BBC REPAIRS
First company in all UK to introduce while-u-wait service. Now first to offer an international repair service.
I have come across a firm that will be more than willing to advise you as to how to remedy your problem. They are called MANCOMP, and as well as repairing faulty Spectrums, are also quite willing to discuss your problems with you, and offer reasonably cheap, and (more importantly) correct cures.
PHIL ROGERS 'Peek & Poke' "POPULAR COMPUTING WEEKLY" January 1985 (Vol IV No 1)
My Spectrum blew recently. I took it to Mancomp who fixed it in eight minutes! And for less than £10. They are local, clued up, and blindingly efficient.
COMPUTER COLUMN 4 HEATONS DIGEST Vol 1 No. 11
One firm at least can usually effect any necessary repair over the counter in forty five minutes. Based in Manchester, Mancomp can offer what is arguably the fastest turnaround in the business to personal callers.
CRASH MAGAZINE JUNE 1985
AVERAGE £15
PHONE/SEND SPECTRUM
FOR FREE ESTIMATES ENC £1 80 (U K I O M EIRE, C.I)
£2 50 (EUROPE/SCANDINAVIA) NO HIDDEN
HANDLING CHARGES 24 HOUR TURNAROUND
OPEN TILL 7 P M MON – SAT KEYBOARD FAULTS £9
MANCOMP LTD.
(Dept PCW), Printworks Lane, Manchester M19 3JP
Tel: 061-224 1888
Computer Repair Centre
Have you got problems with your computer. Then call us for
Commodore BBC, Spectrum, Dragon
Mail order or call in
Enfield Communications
135 High Street, Ponders End, Middx
Tel: 01 805 7772
TO HIRE A COMPUTER and/or peripherals by the week or month please ring 01-607 0157 or 01-997 6457. We specialise in BBC and Apricot computers. Computer Hire Services 294a Caledonian Rd London N1 1BA.
"Micromend Computer Repair Specialists"
Acorn Commodore and Spectrum
Fixed price repairs
Plus P&P £2.00
Mail orders or callers welcome
SPECTRUM REPAIRS
R A ELECTRONICS,
COMPUTER REPAIRS
Access
Book your Classified or Semi-display advert by Credit Card
Call David Osen on 01-437 4343
VISA
SINCLAIR & ACORN REPAIRS BY INTERSERVICE ELECTRONICS
CHILTERN COMPUTER SERVICE
CHILTERN COMPUTER CENTRE
TEL. 0582 455684
SCOTLAND'S No 1
For home and personal computer repairs
Same day for most faults
Free estimates
MICRO-SERV
COMMODORE REPAIRS by Commodore approved engineers. Vic 20 Modulators £6 50 Vic 20 from £14 50 CBM64 etc for more details write or tel G. C Bunce & Son 36 Burlington Road Burnham Bucks SL1 7BQ Tel 06286 61696
CBM 64 ● SPECTRUM ● VIC 20
SOFTWARE HIRE
FREE MEMBERSHIP
ALL TOP TITLES
ONLY ORIGINALS USED
PROMPT PERSONAL SERVICE
VIC 20 SOFTWARE HIRE (PCW)
FREEPOST
NOTTINGHAM NG1 1GR
TELEX YOUR CLASSIFIED COPY TO:
29627S
SUNRGY
FAST COMPUTER REPAIRS
VIDEO VAULT INTERNATIONAL
10★ REPAIR SERVICE
Are you fed up with waiting weeks for your Home Computer to be repaired!!!
★ While you wait Service by Professional Computer Engineers.
★ 3 Months written guarantee on all repairs.
★ International repair company
★ Most Spectrums repaired within 45 minutes.
★ All Micros insured for return journey
★ Open 7 days a week.
★ Free software with each Spectrum repaired worth £5 95.
ONLY GENUINE SINCLAIR PARTS USED
TRADE ENQUIRIES MOST WELCOME
ACCESS WELCOMED
VIDEO VAULT INTERNATIONAL LTD (Dept PCW) THE LOGICAL CHOICE
VideoVault
Tel: (04574) 66555 67761
140 High St West Glossop Derbyshire, England
FREE GAME WORTH £5.95 WITH EACH SPECTRUM REPAIR



FOR SALE

ATARI 800XL 1050 Disk Drive 1400 Printer 1010 Recorder Manuals Disks Software All guaranteed £360 ono separable Tel 308 8680 (Andy)

ATARI Databasic C8 Basic subroutines for creating a multikeyed index Sequential Database. Disk using DOS 2 Ixian Technology 5 Crayford Rise, Maidenhead Berks 1SL6 7LR

LYNX 96K with Centronics Interface Star DP8480 Printer good assembler and accessories All mint condition £360 ono Tel 0788 81643

COMMODORE 64 Disk Drive C2N Joysticks 70 Cassettes 17 Disks 9 Books 4 Cartridges As new cost £1 600 £680 ono Tel 0790 53161 ask for Jason

COMMODORE 64 Cassette Programs transferred to disc (originals only) Send name of program & stamped addressed envelope to P J Mansell 8 1he F: Tres, Thorpe Willoughby, Selby, N Yorkshire YO8 9PR

SANYO MSX MCP100 a Plus 64K Enterprise for sale Brand new boxed guaranteed. Surplus to requirements of Software company £139 Cheques/PO s to Crushproof Software Limited 66 Addison Road Bromley Kent BR2 9TT

QL Brand new latest software, £350 ono Tel (Matthew) 01 727 2829

SPECTRUM 48K unused tape recorder Interface joystick many games Iot worth over £200 new accept £120 (Upgraded to Commodore) Tel (01) 348 7884 (after 6pm)

SPECTRUM including cassette recorder Currah programmable interface and numerous games £280 ono Tel 09904 5108 (Ask for Fraser)

Acorns for Sale

BBC CASSETTE RECORDER eaus cover plus S/W £170 ono Tel 0442 61372

BBC B 18 months old Hardly used 1 2 O/S £100 of Acorn original soft games inc Avaiter and Shooker New cassette recorder all leads £200 Paul Tel 01-908 8200 evenings

QL CST DISK INTERFACE Inc microdrive to disk conversion Manual Operates with any BBC d sc drive Inc Commands from QL £86 Tel Bracknell 868 231 after 6pm

BBC MODEL B, three joysticks £200 of S/W books cassette recorder dust cover and Brother printer £650 with printer £350 without Tel Bradford 612 882

BBC B COMPUTER 1.2 O/S Tandy cassette recorder joystick all necessary leads books and manuals mags £400 Tel Littlewick Green 062 882 3508 after 6pm

ACORN ELECTRON with five games Excellent condition £90 or swap for CBM 64. Tel Buckley 542483 ask for John

Commodores for Sale

CBM 64 software. Turtle graphics cartridge £28 Zork II £8 Zork III £8 Ghostbusters £5 Encounter £6 Flastop cartridge £10 Lazarian cartridge £6 No swaps or offers Tel 0002 81022 after 6pm

CBM 64 + C2N 2 joysticks £180 worth of s/w Worth £420 settle for £250 Tel Andy 0833 314201 after 4pm

VIC 20 starter pack many games including s got cartridges and two ve cassettes will swap for 16/48K Spectrum or sell £100 May deliver Epsom Downs or Sutton area Tel Chris 07373 55681

BBC/LVL dual 100K disc drive for sale £110 o n o powered by BBC micro good condition complete with manual and utilities discs etc Tel Penn 4178 after 7pm

BBC B 1 2 o/s Acorn data recorder Acorn joysticks Arcade style joystick etc interface plus £200 s/w Cost £680 accept £330 w I separate Tel 0742 393825

DESK DIARY £8 Acornsoft database £10 Dam ne Invest £15 Gemini cashledger £15 Dialdg home accounts £9 The music system £16 Evil Dead £3 Te Simon 01 387 8175

DISK DRIVE single 40 track 100K for BBC micro with utilities disk leads manual v g c £78 Tel Yateley 0252 878140

BBC prism modem 1000 for sale unboxed brand new unwanted present £35 postage £2 Tel Rugby 0788 812910 after 7pm.

COMMODORE 64 with C2N data recorder two joysticks over £90 worth soft ware a bargain at £160 All as new and boxed Andrew Tel Bookham 56625

CBM 64 + C2N TAPE DECK + B/W TV 1 approx £95 software About 10 months old all vgc quick sale for £160 ono Genuine reason for sale Steve Tel Coventry (0203) 416809

VIC 20 plus disc drive for switchable Ram cassette interface monitor leads TV modulator ? PGA motherboard, two Epsom machine code monitor cartridge box of 10 discs Offers around £125? Tel 01 984 7556 any time

CBM 64, C2N cassette £300 worth of original S/W 50 mags – joystick Guaranteed £225 Tel 0632 71211

CBM 64 + VIC 20 16K – C2N cassette deck and light pen + 2 J/S + S/W for sale everything for £250. Tel. Harpenden (05827) 2467

CBM 64 + DISC DRIVE – tape deck. Modem as new 45 double-sided discs full of programs 150 Tapes dustcover 2 weeks speech synthesisers cartridge 3 games Cost over £1050 bargain at £400 Tel 0226 780436

VIC 20 7 cartridges chess Pacman £40 Mr Wood (YMCA) Tel 01-340 2545

VIC 20 plus Intro to Basic S/W games cartridge super expander cartridge programmable reference guide books Sell £75 or o Tel 061 ?? 5020

COMMODORE 64, 1541 disc drive + MPS 801 printer modem 1000 C2N tape with Phillips B/W television joystick and trackball S/W Sell £550 ono Tel 061-420 2378

COMMODORE COMPATIBLE dot matrix printer Seikosha GP100VC £80 Tel 0272 837817

CBM 64 1541 disc C2n cassette backup board reset switch two joysticks plus £4 000 of software disc and tape games and utilities Give away at £350 Tel 0432 33841

VIC 20 DECODER super expander Arfon expansion 16K cover 2M/C monitors 8 cartridges 75 sheet programs 88 tape programs books intro Basic 2 revision packs joystick worth £1 200 will sell £275 ono Chris Tel 0273 558138

CBM 64 boxed (under guarantee) cassette deck Quickshot joystick, paddles, Introduction to Basic £200 Software Zaxxon Beach Head Encounter etc. Books and mags Total value over £500 sell lot for £385 Gary Sigsworth 32 Manorgate Road Norbiton Kingston Surrey K12 7AL

CBM 64 C2N, joystick, manuals plus £100 worth of original software only £180 I re offer secures Tel 01-800 4994 after 5pm

Dragon

DRAGON 32 DATA RECORDER S/W joystick, 3 year guarantee Swap for Atari preferred Preferably disc drive Tel 07373 55140

TWO DRAGON 64s One Dragon disc drive controllers Buz box modem and lead (plus S/W) joystick, books OS-9 B/W sell £800 ono Tel 0293 26881

DRAGON DOS cartridge plus manual for Dragon £50 Tel Staines 58707 after 6pm

DRAGON 32 joystick over £190 of software a bargain at £80 Software includes the King Hungry Horace etc Tel 061 485 7794 after 4.30pm

DRAGON 32 over 2 years old Hardly used £155 of original S/W Joystick, light pen books and O U mags £70 the lot Tel 01 562 3278 after 6pm

DRAGON 32 boxed £100 I software joystick books all Dragon users dust cover £120 ono Tel 01 903 3047 after 5pm Ask for Pap

DRAGON 32 12 months old over 80 games With joystick, recorder Dragon user mags Could deliver £75 or swap any 35mm camera Tel Wakefield 0904 363043

DRAGON 32 COMPUTER plus books and S/W Plus THS 80 cassette recorder £120 Tel 0242 510410

DRAGON 32 and joystick + S/W manuals and mags a I for £75 ono Tel 01 644 3806

DRAGON 32 + 16in B/W TV and 100+ programs. Best arcade (M Miner etc) adventure educational some utilities + business progs All perfect condition only £125 Steve Tel Crewkerne (0460) 73723

For Sale

SELL AMSTRAD CPC464 plus colour monitor joystick printer cable and games for only £225! Sell without monitor £100 Write to Derek Scott 26D Harden Place Hawick, Roxburghshire Scotland TD9 7BY

AMSTRAD CPC464 colour monitor Quickshot 2 joystick cover £50 software mags excellent condition still with 6 months guarantee. quick sale required hence only £240 Tel 01-858 6914 after 6pm (Greenwich)

NEWBRAIN Module A Zen assembler book n b dissected and various useful n/ b technical notes £110 Tel Chelmsford (0245) 460180

AMSTRAD CPC 464 colour monitor Tasword 464 1ss printer style writer Only one month old unwanted prize for £290 Tel 038-483 8028 Nick

SX64 portable plus joystick + s/w £475 Te (0344) 761341

ZX PRINTER paper Going cheap Call Daniel Redlett 2673

SPECTRUM 48K 4 months old guaranteed boxed 24 tapes original Interface + joystick. £90 Tel 0823 2830621

CUMANA disc drive CS100 single sided version four discs 5 year g'tee £100 Tel 021-476 9881

QL VERSION 2 psion programs Ini sale Quill Easel Abacus and archive with documentation All unused £90 for all four Tel York (0904) 789184

DISC DRIVE Cumana for BBC includes PSU Utilities disc blank discs, all for only £165 Phone Godalming 6889

CURRAH Micro Speech £18 Trojan lightpen £14 Prinek Modem £30 plus hundreds of Spectrum tapes for sale ha f price or less Ring Sean at 0504 59601

EPSOM PX8 portable computer new with Wordstar Supercalc cardfiox and all manuals manufacturers warranty £685 ono Tel 0296 85325

PRISM Modem 1000 1200/75 with BBC software and lead £50. Tel Bill 031 707 1043 after 6pm

MTX512 twin RS232 ports plus Brother EP22 printer typewriter some software thermal paper manual plus Ian Sinclair MTX comp £360 ono Phone 0525 317360 evenings only

JUPITER ACE 3K boxed with all leads manual demo tape etc Sell for around £15 or offers Ring 01-856 7420 after 5pm

MEMOTECH MTX-512 very good condition with two games. Quick sale required thus only £125 ono Tel Maidstone (0622) 683718 after 7pm

AMSTRAD CPC 464 (colour) excellent condition £296 ono RSX Sycnics Electro Freddy Mentor Chase Code Name Mat £5 50 Knightlore Snowball £7 Hobbit Screen Designer £10 Devpac £15. Phone Simon after 5pm (0342) 45784

POPULAR COMPUTER WEEKLY robot trolly for Spectrum fully assembled – not in kit form with tape to make it run £1½ post paid 0428 713015

OSBORNE! Excellent condition twin drives built in monitor 64K Ram Software includes Basic Wordstar Mailmerge Supercalc all manuals A machine for the serious user £560 01 441 2065

AMSTRAD CPC 464 colour – joystick + software (Sorcery Pyjamarama, Defend or Die + others) Firmware guide user magazines worth £460+ sell £325 Amstrad DMP1 printer + Easi-Amsword unused £150 together £450 Contact Tim Southampton (0703) 335246

COMPUTER magazines and one book for sale All £10 For interested Electron users write to P Leigh 34 Queens drive Cheshunt Herts

ORIC ATMOS with s/w books dust cover printer lead Perfect condition £90 Tel John Ripley 88-993

CUMANA DISK DRIVE with integral PSU and DFS Just plug in and go Includes utility disk and blank disks Offers over £175 Tel Godalming 6586 new for a great deal

FOR SALE Simons Basic International Soccer Aztec challenge beta and magazines for the CBM 64 and Vic 20 Tel 061 853 0246 or write Wolstenholme 13 Higher Wood St, Middleton

FOR SALE 1541 disk drive plus 12 disks £160 ono Martyn Tel 048 275 494

SUPERSCRIPT £150 Visi-Calc £100 PSS li e £80 All three £350 for TRS 80 model 4P All brand new Chris Harvey Tel 0922 20181 (work) 0922 58722 (home)

ALPHACOM printer for Spectrum plus 6 rolls paper and prism VTX 5000 modem £40 each George Phillipson Tel 764 4087 (Surrey)

FOR SALE Interface Two for Spectrum £12.50 Christopher Tel Bedford (0234) 60724

SHARP MZ80K SOFTWARE £110 Sord M5 Basic F FALC printer cable cassette unit £60 Would consider swapping Sord M5 etc for Oric1 or Atmos or Lynx Tel 0480 75036 after 6pm.

REC PC8201A PORTABLE COMPUTER 32K extras cost £600+ £300 ono Hitachi 17" colour TV £30 ono Chase electric organ (unused unwanted gift) retails £500 £250 or swap QL Amstrad or other Tel 061 205 1860 eves

MEMOTECH MTX 512 64K ram with Pascal compiler on Rom board printer and leads worth in excess of £650 will sell for £500 or nearest offer Tel Leeds (0532) 652471 any time

QL PSION UPDATE of Quill archive Easel Abacus plus documentation unused £30 Peter Moreland Tel 01 727 6069 after 7pm

CRASH ISSUE ONE Offers to Stewart 6 Main Road Paisley 041-887 8264

ORIC ATMOS boxed 27 games software including Hisoft Author Three books some user mags leads, RGB Centronics and remote cassette £100 ono Will deliver Tel Chard (04606) 5038

AMSTRAD CPC464 PROTEK MODEM unused Includes software for it to run on Cost £109 from catalogue £70 ono Tel 310 5701 after 4pm

TI 99/4A JOYSTICKS £5 Early reading module £1.50 Hunt the Wumpus £4 Numeric Magic £4 Early Learning Fun £4 All new modules Thorpe 30 Glenshesk Park Dunmurry Belfast BT17 9BA Tel 0232 623001

TRS-80 MODEL IV 128K twin disks tech manual carry case £850 Line printer VI for above 13.5" Centronics £800 or sum for £1 000 Offers please to Time Steele Tel 05645 78218

SINCLAIR QL + JOYSTICK + books + QL User magazines + 3-D Chess. Little used Cost over £460 offers around £300 Brother M 1009 Epson compatible printer Hardly used Offers around £130 Senior Tel 254 5952 after 5pm

MODULATOR MP-1 AMSTRAD unused brand new £19 Repeated present. Tel 061 707 2373.

QL, brand new boxed and updated S/W plus eight space microdrive cartridges £330 ono Tel 01-941 4678

CURSOR clip-on joystick for sale For Spectrum Offers Tel 0783 81398

MODEL RADIO-CONTROLLED racing car very good condition Original box including transmitter Will sell for £25 or swap for ZX81 or Vic etc. Will post if required free! Tel 0244 675717

TI 99/4A ext Basic Alpiner Munchman Wumpus Moon Mission Grammar tapes games books manuals. Joystick leads cassette recorder as new boxed £110 Would split Tel 0202 682884

SINCLAIR flat face TV Brand new unwanted gift. 12 months g/tee £68 ono Tel 0302 49475 Tim.

SHARP MZ-80A built in green monitor and cassette deck Plenty of software including Arcade and Adventure games Hisoft, Pascal and assembler Mint condition £250 ono Tel Leeds (0532) 604431

TI 99/4A pair joysticks new £5 Joystick interface Atari New £2.50 Selection software See for list Wanted extended Basic module Tel 0232 623001 32 Glenshesk Park Dunmurry Belfast BT17 9BA

ORIC-1 48K with various software including Arcade games, Adventure games Word Processor and Assembler All in original packs Offers around £40 considered. Tel 0462 730067 (Herts-Beds)

CARTRIDGE, editor and assembler with Zen book for Tandy colour comp or Dragon 32 Cost £45 Sell for £20 Tel 872846 (Notts)

AMSTRAD CPC-464 (colour) excellent condition £295 ono RSX Cyclone Sorcery Electro Freddy Masterchess Chessmaster £6.50 ono Knightlore Snowball £7 ono Hobbit Screen Designer £10 ono Devpac £15 ono Tel Simon after 6pm (0242) 45764

SA48 2 matrix printer IEEE RS232 Centronics parallel tractor friction feed £100 or swap for Amstrad FD1 disc drive Tel 0582 38436

ORIC 1 48K plus tape deck plus leads £120 Software (inc Zorgons Revenge etc) Some books and magazines Accept £85 Tel 01-304 6460 after 6pm Ask for Iain

MEMOTECH MTX512 word processor Pascal and Communications software on ROM RS232 board printer and £150 of software Worth over £900 sell for £550 ono Send sae to Mr A E Fisher 15 Alvord Avenue, Prestwick KA9 2JU

PRISM modem with Prestel Micronet, ROM Only three months old £50 ono Tel 061 370 0686

AMSTRAD disc drive including interface under guarantee Complete with manual CP/M disc and leads £180 ono For more details telephone (0877) 42803 after 6pm except Thursdays

LYNX 48K as new £50 ono Also parallel interface £20 software £8 word processor £5 Model-60 £3 Numerons £2. Tel York 51130

VIX 5000 modem for Sinclair Spectrum brand new unused only £40 ono Tel 021-476 4251

AMSTRAD CPC 464 with colour monitor and over £100 worth software Boxed as new Over 10 months original guarantee Must sell so only £270 ono Tel 0372 (Leatherhead) 373331 after 5pm

SHARP MX808 48K monitor Datacorder Some software £110 ono Sord C6LM5 Falc BasicF graphics designer £40 ono buyer collects Tel 0480 74551 after 6pm

AMSTRAD CPC464 mono for sale Guaranteed Includes manuals plus S/W For further details see you offers. Tel 0377 42803 after 6pm

Spectrums for Sale

BARGAIN Spectrum add-on full er keyboard £24 Currah speech and slot £20 Very reliable data recorder guaranteed £17 Ram turbo joystick interface and joysticks £18 Darren Tel 01-393 3908

48K SPECTRUM Kempston Pro 5000 joystick and Kempston joyslink/Rom cartridge interface All still boxed goes as new and some original games Bargain at £100 Tel Maidstone (0622) 45891 evenings

SINCLAIR 48K Spectrum loads of programs Pascal book M/C books Monitor loan insanity Adventure £80 ono Tel 0382 461545

ZX SPECTRUM water drive 22 wafer cartridges Currah speech Currah slot parallel Centronics printer interface Pro joystick interface Kempston Formula 1 £700 of software all original Will sell for £550 ono Tel 01-461 1933 after 7pm

48K SPECTRUM interface 1 and microdrive 40 cartridges with software manuals loads in original boxes £215 ono Would swap for Amstrad and monitor or will separate Bill Tel 01-572 2917

48K SPECTRUM joystick interfaces TV radio cassette recorder plus over £100 of software with magazines only £220 ono (all games are originals) Tel 061 528 5820 after 5pm

SPECTRUM microdrive, Interface 1 DK Tronics keyboard Fox programmable joystick interface Tac 2 joystick Tripos Command joystick cassette recorder cartridges books and software All in mint condition £200 Mick Tel 0298 348686 after 6pm

48K SPECTRUM ZX printer for sale £80 ono or exchange OM A4 printer or Acorn Electron Tel 01-979 5047 daytime ask for Chris

SPECTRUM 48K Kempston Interface. Quickshot I over £200 top games including Underwurlde Knight Lore 4 books lots of magazines worth over £380 only £150 ono Tel Cannock (05435) 3369 ask for Simon

SPECTRUM Currah micro speech, tape recorder printer and 12 rolls of paper Fuller box Kempston interface, 18 games books 100 plus magazines Cost £240 sell £80 ono Tel Hornchurch 87987 after 6pm

SPECTRUM 16K Plus 32K Cheetah rampack and tilted DK Tronics keyboard almost new £70 Tel 061-625 3905

48K SPECTRUM, Alphacom 32 printer paper £200 worth of games Spy Hunter etc. Crash magazines All in excellent condition Sell for only £200 Tel 01-449 1571 after 5pm

48K SPECTRUM reset switch Interface 2 1 cartridge Quickshot I joystick Kempston interface Original s/w £500 Sharp cassette recorder and leads Sell £170 Tel 0203 368920

SPECTRUM 48K III Quickshot II joystick interface data recorder 11 games Bargain £130 Tel Bolton (0204) 46972.

SPECTRUM 48K W H Smith recorder £80 Tel 589 221 (Crayford) day only Helen

SPECTRUM Plus, Inc speech (Cheetah) £200 of original s/w joystick interface all new s/w inc Ultimate cheapest price £100 2 months old leads etc Tel 0734 787 442

48K SPECTRUM Interface 1 microdrive 11 cartridges Cheetah keyboard Kempston joystick lightpen speech synthesiser Tasword Pascal Logo Devpac 16 books many games very good value at £250 Graham Hopkins Tel 0372 20880

SPECTRUM 48K for sale with lo-profile keyboard Currah speech synthesiser DK Tronics lightpen tape recorder £380 of software worth £550 sell for £350 Single sale preferred. Tel 0908 72605 evenings

SPECTRUM Plus microdrive and interface 1 6 microdrive cartridges Interface 2, and Rom cartridge and joystick tape recorder and £200 of new games and utilities inc Jet Pac Moon Cresta £250 ono or swap for 64K Enterprise Russell Tel 0276 456747 need Also Atari VCS and cartridges £25 ono

SPECTRUM 48K perfect condition plus 36 assorted software titles inc Midnight, Knight Lore Sherlock etc Original packaging as new £200 ono Tel Barnsley 0226 243071

ZX SPECTRUM model III interface II Rom turbo interface. 10 books many mags over £150 s/w tapes (Psytron etc, two Rom cartridges) All £195 ono Richard Tel Wrexham (0798) 757817

SPECTRUM 48K for sale with joystick interface cassette recorder and well over £200 worth of software including Alien 8 Bruiserdash Dark Star Pyjamarama Avalon and Underworld Only £158 ono Tel 0243 6021-36

SPECTRUM 48K with printer 5 rolls of paper DK Tronics lightpen, Kempston interface Quickshot II joystick carry case 36 original games and other software immaculate condition Sell for £280 Tel 0708 44332

POPULAR COMPUTING WEEKLY robot trolley for Spectrum Fully assembled (not kit) with taped program ready to run £16 Tel 0428 713018

SPECTRUM 48K + printer boxed paper Kempston interface Quickshot 2 Joystick, mags + games £118 Tel 0702 545 640

SPECTRUM 48K + Kempston Joystick, £200 of original s/w £140 Tel Preston 731 853 eves

48K SPECTRUM light gen DK Tronics Board Hi-Soft Pascal DES pack, Bks etc. £150 Or swap for BBC + cass Tel Harlow 0279 415079

SPECTRUM 48K tape recorder Kempston Joystick Interface £110 of original s/w still boxed £135 Tel Andover 0264 95678

COMPUTER SWAP

Computer Swap entries are limited to 30 words Either fill in the accompanying form and send to Computer Swap *Popular Computing Weekly* 12-13 Little Newport Street, London WC2H 7PP or telephone 01-437 4343

All software offered through computer swap must be in original condition and for private sale only

It cannot be swapped
Warning: It is illegal to advertise pirated software

COMPUTER SWAP

Please write your copy in capital letters on the lines below.

Name ....

Address ....

....

Telephone ....

ZX SPECTRUM £300 of original s/w joystick interface Speech unit, Stack Light Rifle Interface 2 with cartridge £100 Tel 01 904 1382 (Alex) after 6pm

48K ZX SPECTRUM Saga keyboard Interface Microdrive 9 cartridges Interface 2, 2 rom cartridges lots of software Banks magazines worth over £400 accept £230 ono Tel Blackpool 700629 or 51544

SPECTRUM 48K, tape recorder and over £60 of software leads PSU etc All in good condition three months guarantee Only £80 or £90 if sorted Tel Andy on Leeds (0532) 557038

48K SPECTRUM data recorder 38 original games inc Chess Atic Atac Scrabble etc 20 C15s 4 books lots of magazines worth £300+ sell for only £200 ono Tel Leeds 524856

SPECTRUM 48K Plus with Microdrive still under guarantee (8 months) also insured 3 years Lots of software including RT1Y Morse Transceive and some Ham radio Seea FT290 Cash £200 Len 021-453 9782.

48K SPECTRUM leads manual mags software worth £80 inc Quill Brian Bloodaxe all originals, just £80 Tel 0223 842871 (evenings)

FOR SALE 48K Spectrum cassette £300 s/ware Currah speech ender joystick l/face etc Will sell for £380 ono. Tel 0226 382497 ono Ask for Rick.

DIARY

Event	Dates	Venue	Admission	Organisers
Computer Show	July 20 10.30am-5.30pm	Old Vic Hotel Lichfield Rd Wolverhampton	50p	CJS/Northleach 04516 600
Tatung Official Acorn User Exhibition	July 26 Trade, 10.00am-1.00pm July 26 28	Barbican Centre London EC2	£3 adults £2 children	Computer Marketplace (Exhibitions) Ltd 01-930 1612
Computer Show	July 27 10.30am-5.00pm	Cornbow Hall Hagley St Halesowen	50p	CJS/Northleach 04516 600
The Micro Trend III	Aug 11	Barnsley General Hospital	60p adults 60p children	Falcon Computer Services 0226 53041
Small Business and Home Computer Exhibition	Aug 19-20 10.00am-8.00pm	"Goldiggers" Timber St Chippenham Wiltshire	£1.50 adults £1.00 children	Kevin Angell/ Simon Mann 0249 604400
Personal Computer World Show	September 4-8	Olympia London	£3.50	Montbuild 01-486 1951

Wanted

SWAP ROTRONICS Wafadrive + 22 Wafas 1200 modem for the ZX Spectrum Kempston Pro Formula 1 Currah Speech + Slot. Swap for the Epson FX 80 Printer or will sell for £225. Tel after 7 00pm 01 391 1933 Philip

WANTED BBC SOFTWARE tape or disc. Tel 0423 883483 (Harrogate) evenings only

WANTED ATARI 810 disc drive also 48K Atari computer Not working considered For sale Spectrum tape controller/copier also books Tel 061-432 4536 evening or weekends.

ORIC ATMOS MANUAL urgently wanted will pay up to £5 00 (any condition) Please ring John on Witney 2567 or on Ramsgate 288 (after 6)

WANTED FOR YOUNG GIRL Atari computer also disc drive Not working considered if cheap Tel 061 432 4536 evenings or weekends

SWAP 48K SPECTRUM + ZX81 with all leads manuals with over 100 games including Air Wolf for BBC B + leads + manuals and games peripherals if possible or sell for £460 ono (worth £800+) Tel Ruabon 821133 after 5pm

I WOULD LIKE TO HEAR from anybody who have built the buggy for the Amstrad with good results, as I have not Mr Stan Fowell 5 Woodward Road Dagenham Essex RM9 4EH

WANTED Expansion Unit for MZ80K Tel Melton Mowbray 812248

WANTED expansion unit for MZ80K Tel Melton Mowbray 8122348.

EXCHANGE KORG SA630 keyboard cost £450 Swap for complete system Tel 01 836 1488

SPECTRUM 48K PLUS 2 joysticks interface cassette recorder swap CBM 64 Tel Chesterfield 204 794

TRS80 Colour Computer s/w and accessories wanted Anything appreciated Good prices paid Details to Mr Faytij 23 Arandel Drive Orpington Kent.

SWAP your CBM64 C2N recorder for 48K Spectrum with FDS keyboard Sound AMP j/stick & speed controller interface Tel Potters Bar (0707) 50345 (evenings)

SWAP Commodore 64 for 2 Spectrum plus Tel 01-648 5806

WANTED New titles for ZX Spectrum offers Tel David 2873 Raslette

BBC B Graphics Rom Disc Doctor Rom joystick, BKS mags cover s/w Swap for CBM 64 C2N player 1541 disc drive etc Tel 01-647 9658

SWAP 48K Spectrum printer 3 chanel sound unit programmable joystick echo sound box, s/w Swap for media drums machine or expander or 4 track tape recorder Tel 01-598 6655

SWAP audio 9 CB + aerial + power pack for CBM printer NOT printer plot for Sell £95 Tel Kevin (Dartford) 79745

WANTED modem for BBC Tel Sunderland 40856

WANTED disc drive or disc interface for ARC monitor Tel Sunderland 40658

SWAP MZ700 2 data recorders joystick RGB cable nine games two 10 game pack for Atari 800XL plus 1010 recorder with 5 months guarantee Tel Gosport 522737

ATARI 400 or 800 wanted for spares, any condition more than 16K Also wanted ZX printer or Atari printer plotter any condition I have ZX81 sound board + games in exchange for ZX printer or will buy Write to Gareth Rollinson 15 Stirling Rd Bolton BL1 6RQ

WANTED Star Wars cartridge by Parker Bros for C64 Will pay £10 Phone Hornchurch 45284

WANTED disc drive and or interface for Oric Atmos. Phone Singer Sheffield (0742) 554762

VECTREX games cartridges wanted to buy also Vectrex lightpen and Vectrex joystick wanted Phone Russ on Coventry 594017

AIRGUN – Target Rifle, IJ-28 .177 with Diopter sight and several 100 pellets Swap for Spectrum 48K or Metacomco Pascal for QL Tel 0325 312417

WANTED CBM 64 disc drive in good condition pay reasonable price Also wanted adventure programmes Emerald Isle Valkyrie 17 originals please tel 021 328 2984 anytime Unavailable leave tel number

SWAP BBC B Opus Odes DS100 disc drive cassette recorder joystick software £200 For Amstrad CPC 464 + colour monitor + software or sell £430-450 Write Mr MacLeod 2 Bridgend Gillock by Wick, Caithness Scotland KW1 5UT

WANTED URGENTLY, Wico joystick straight lever not red ball £10 offered. Richard Tel 031 733 0090

ATARI 1050 disc drive and 800XC Plus large amount of original S/W Rare American titles. To swap for any good BBC outfit Call any time Tel 01 589 743.

EXCHANGE Sharp QT 90 stereo radio cassette for CBM 64 and C2N cassette for details Matt. Tel 0602 630 381

WANTED SORD/CGL M5 32K Ram extension and SORD FD5 floppy disk system Ipswich 215755

WANTED modem for Oric Atmos 48K, must be complete Jone Tel 0482 857345 after 6pm

WANTED SPECTRUM 48K (not Issue One) and tape deck All offers considered Tel 01 207 1774 ask for Mark.

WANTED ALPHACOM 32 printer for ZX Spectrum in exchange for original ZX Spectrum keyboard and dust cover + £20 Douglas. Tel 01 987 1204 (Anselone)

COMMODORE 1541 DISK DRIVE wanted with or without software Will pay up to £120. also ZX Spectrum lightpen with interface £10 + P&P Tel Ruthin 4078 after 4pm

WANTED ALPHACOM 32 PRINTER for £20 Also crash dude do 1 wanted for £1.50 Tel. Pontefract 0977 704029 evenings

WANTED ANY PRINTER compatible with CBM64 in good working order Reasonable price paid apply Sid Tel 021 328 2984 any time If not available leave number will ring back

SINCLAIR SPECTRUM INTERFACE I and microdrive Kempston joystick interface and joystick ZX interface II over £200 of original S/W Cassette reader Swap for CBM 64 Tel 362508 (Bolden) after 6pm

SWAP Spectrum 48K S/W joystick interface B&M programmable cards. For Atari 800XL 1010 recorder or sell for £120 Tel 031-661 3411 after 8pm

SWAP £350 (S/H value) of photographic and darkroom equipment for good computer such as Sharp MX80A Einstein, Amstrad CPC 464 with colour monitor BBC B complete with disc drive or colour monitor and software. Mr J H Todd 99 Hallcroft Birch Green Skelmersdale Lancs WN8 6QD

MCP40 COLOUR PRINTER for Dragon With three rolls of paper and pens All boxed Swap for Brother HR-5 for Dragon Tel 0706 31239

48K SPECTRUM INTERFACES 1 & 2, microdrive printer Kempston Currah speech box printer paper ten cartridges about seventy boxed original games, ten Books, etc. Swap SLR camera/extras Tel 06864 560 (Worcs)

WANTED Atari 600XL 48K Ram expansion board Tel 0524 410438 and ask for Simon

WANTED Adventure scenario writers Experienced programmer requires good plots leads etc. with view to commercial product. Any offers write to W Forster Frowatree Farm Tahwn Green Malpas Cheshire SY14 7NA.

SWAP Sinclair DM235 digital multimeter excellent condition with leather case and leads for Lo Profile or DK Tronics keyboard Tel 041-774 6311 and ask for Alastair

SWAP TAMIYA R/C electric F 1 racing car complete with radio gear Ready to race for DK Tronics speech synth/stereo amp for CPC 464 Keith Payne 17 Bowden Road Ramsgate Kent CT11 9DZ

WANTED TI99/4A, cassettes and cartridges or equipment and mags etc Offers Tel 01-427 7336

ADVENTURE
HELPLINE

Erik the Viking on BBC B How do you kill the troll? Duncan Max Blackbrook Farm, Felton, Morpeth Northumberland

Eureka! (Roman Britain) on Spectrum. Where is the golden eagle where is the tiger's skull, how do you get an invitation? Richard Rudkin 25 Broom Close, Stanley, Co Durham DH9 0UU

Robots on TRS 80 Color. How do you open the door next to the rug over the pit? K Crouch, 34 Bellamy Road Cheshunt, Herts EN8 9JT

Eureka! (prehistoric) on Spectrum. What do you do in the sacred caves I'm stuck at 70% – any help appreciated Richard Rudkin, 25 Broom Close Stanley Co Durham DH9 0UU

Rendezvous with Rama on C64. How to get to the south pole and any other help J H Pickford 5 Poplar Green Bollington Macclesfield Cheshire

Macbeth (1) on C64 I've got as far as the beach, but now I'm stuck. Plus help for other three adventures. Simon D Chatterton 3 Green Cross, Dronfield, Sheffield S18 6LH

Castle of Chantis on Spectrum. How do you get past the bear and enter the town of Senavie? Stephen Richmond, 8 Pulborough Way Flansham, Middleton-on-Sea W Sussex

Castle of Terror on Commodore 64. I can't find the wooden stake to kill the count P J Fox 84 SU RAF BFPO 53

Hampstead on Spectrum. How do I get the manual on how to do Hampstead in the toy department? What do I do at the bank? Adrian Reid 10 Towersey Drive Thame Oxon

Return to Eden on Spectrum. How do I cross the lake? What is the brick egg for? How do I get off the island without falling? Bob Foster 99 Glenfield Way Glenholt Park, Plymouth.

Erasim and Sherlock on Spectrum I need a dictionary of words used S J Vince 28 Chichele Road, Oxted Surrey

Message From Andromeda on Amstrad. How do I get to use the crystal rod (ultrasonic key) knife, detonator and any other items? Mike Caiger 50 Armoss Way Leeminville Western Australia 6076.

Twin Kingdom Valley on Electron. How do I get the master key from the dragon? Of what significance is the wooden rod? Peter Quinn, 94 Glenhuntly Terrace Port Glasgow, Renfrewshire Scotland.

Charts

Amstrad

1	(6)	Knight Lore	(Ultimate)	£9.95
2	(1)	Alien 8	(Ultimate)	£9.95
3	(4)	Beachead	(Access/US Gold)	£9.95
4	(–)	Rocky Horror Show	(Access/US Gold)	£8.95
5	(6)	Dun Darach	(Gargoyle)	£9.95
6	(3)	Minder	(DK Tronics)	£9.95
7	(5)	Ghostbusters	(Activision)	£10.99
8	(–)	Fighter Pilot	(Digital Integration)	£9.95
9	(2)	Ghostblaster	(Virgin)	£9.95
10	(9)	Sorcery	(Virgin)	£9.95

Bubblers

Marden's Quest	(Melbourne House)	£8.95
Combat Lynx	(Durell)	£8.95

Atari

1	(2)	Archon	(Ariolasoft)	£11.99
2	(1)	Decathlon	(Activision)	£9.99
3	(3)	Miner 2049 er	(Big 5)	£9.95
4	(6)	Colour Space	(Llamasoft)	£7.50
5	(7)	Drop Zone	(Microprose/US Gold)	£9.95
6	(5)	Ghostbusters	(Activision)	£14.99
7	(–)	Mule	(Ariolasoft)	£14.95
8	(4)	Kissing Kousins	(English Software)	£9.95
9	(8)	Bruce Lee	(Datasoft/US Gold)	£7.95
10	(9)	Beachead	(Access/US Gold)	£14.95

Bubblers:

Hard Hat Mack	(Ariolasoft)	£9.95
Smash Hits 3	(English Software)	£14.95

BBC

1	(1)	Revs	(Acornsoft)	£14.95
2	(2)	Alien 8	(Ultimate)	£9.95
3	(4)	Atic Atac	(Ultimate)	£9.95
4	(3)	Repton	(Superior)	£9.95
5	(5)	Knight Lore	(Ultimate)	£9.95
6	(–)	Confuzion	(Incentive)	£9.95
7	(7)	Magic Mushrooms	(Acornsoft)	£12.95
8	(9)	Wizardore	(Micropower)	£7.95
9	(–)	Lode Runner	(Software Projects)	£9.95
10	(8)	Combat Lynx	(Durell)	£9.95

Bubblers:

Thunderball	(Mastertronic)	£1.99
Boss Jack's Superstar	(Software Communications)	£7.95

Commodore 64

1	(1)	Way of the Exploding Fist	(Melbourne House)	£9.95
2	(2)	Elite	(Firebird)	£14.95
3	(3)	Dambusters	(Sydney/US Gold)	£9.95
4	(4)	Shadowfire	(Beyond)	£9.95
5	(5)	View to a Kill	(Domark)	£10.95
6	(10)	Drop Zone	(Microprose/US Gold)	£9.95
7	(6)	Soft Aid	(Various Artists)	£4.99
8	(7)	Pitstop II	(Epyx/US Gold)	£9.95
9	(–)	Graham Gooch's Cricket	(Audiogenic)	£9.95
10	(–)	International Tennis	(Commodore)	£9.95

Bubblers:

The 4th Protocol	(Hutchinson)	£14.95
Music Studio	(Activision)	£14.95

Spectrum

1	(8)	Hypersports	(Imagine)	£7.95
2	(1)	Jet Set Willy II	(Software Projects)	£7.95
3	(7)	Rocco	(Gremlin Graphics)	£7.95
4	(2)	Soft Aid	(Various Artists)	£4.99
5	(6)	Spy vs Spy	(Beyond)	£9.95
6	(2)	Shadowfire	(Beyond)	£9.95
7	(3)	Dun Darach	(Gargoyle Games)	£9.95
8	(4)	View to a Kill	(Domark)	£10.99
9	(8)	Nodes of Yesod	(Odin)	£9.95
10	(5)	Cauldron	(Palace)	£7.99

Bubblers:

Buck Rogers	(Sega/US Gold)	£7.95
Dynamite Dan	(Mirrorsoft)	£6.95

All figures compiled by Ram/C

Top Twenty

1	(1)	Elite *(BBC/Electron/C64)*	Firebird/Acornsoft
2	(3)	Way of the Exploding Fist *(C64)*	Melbourne House
3	(3)	Soft Aid *(Spectrum/C64)*	Various Artists
4	(16)	Hypersports *(Spectrum)*	Imagine
5	(4)	Jet Set Willy 2 *(Spectrum/C64)*	Software Projects
6	(5)	View to a Kill *(Spectrum/C64)*	Domark
7	(6)	Dun Darach *(Spectrum/Amstrad)*	Gargoyle Games
8	(17)	Rocco *(Spectrum)*	Gremlin Graphics
9	(8)	Dambusters *(C64)*	Sydney/US Gold
10	(9)	Spy vs Spy *(Spectrum/C64)*	Beyond
11	(7)	Cauldron *(Spectrum/C64)*	Palace
12	(11)	Shadowfire *(Spectrum/C64)*	Beyond
13	(14)	Revs *(BBC/Electron)*	Acornsoft
14	(15)	Nodes of Yesod *(Spectrum)*	Odin
15	(10)	Alien 8 *(Spectrum/BBC/Amstrad)*	Ultimate
16	(13)	Herbert's Dummy Run *(Spectrum/C64/Amstrad)*	Mikro-Gen
17	(12)	Knight Lore *(Spectrum/BBC/Amstrad)*	Ultimate
18	(–)	Rocky Horror Show *(Spectrum/C64/Amstrad)*	CRL
19	(–)	Drop Zone *(C64/Atari)*	Microprose/US Gold
20	(16)	Minder *(Spectrum/C64/Amstrad/Memotech)*	DK Tronics

Figures compiled by Ram/C

Readers' Chart No 33

1	(1)	Elite (C64/BBC/Electron)	Firebird/Acornsoft
2	(2)	Soft Aid (Spectrum/C64)	Various Artists
3	(4)	Knight Lore (Spectrum/BBC/Amstrad)	Ultimate
4	(7)	Shadowfire (Spectrum/C64)	Beyond
5	(–)	Way of the Exploding Fist (C64)	Melbourne House
6=	(9)	Alien 8 (Spectrum/BBC/Amstrad)	Ultimate
=	(10)	Dun Darach (Spectrum/Amstrad)	Gargoyle
8	(10)	Starion (Spectrum)	Melbourne House
9	(6)	Rocky Horror Show (Spectrum/C64/Amstrad)	CRL
10	(3)	Confuzion (Spectrum/Amstrad)	Incentive

Winning phrase No 33: "Gin kills the editor" from M Valentine, of Shrewsbury who receives £25. Others who came close include "I need to fight a troll" from C Barlett of Warwick and "Thank God for Elite" form J Brook, of Leslie

Now voting on week 35 – £25 to win

Each week *Popular* is compiling its own special software top ten chart - compiled by YOU

And each week we will send £25 to the person who sends in, with their chart votes, the most original (witty, neat or clever – but never rude) phrase or sentence made up from the letters (you don't have to use them all) in the titles of the top three programs in this week's chart, published above

You can still vote in the chart without making up a slogan – but you won't be in with a chance of winning the prize

All you have to do is fill in the form below (or copy it out if you don't want to damage your magazine) and send it off to Top 10, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP

Voting for Week 35 closes at 2pm on Wednesday July 24 1985. Entries received after that time will not be eligible for inclusion in that week's voting. The judges decision is final. Only one entry per individual per week will be allowed.

Name .... **My top 3: Voting Week 35**

Address .... 1..

.... 2..

.... 3..

My phrase is: ....

New Releases

EXCESSIVE

Thing On A Spring has the best bouncy music I've ever heard on a computer It is so excessive, crass and music hall, chock full of tin whistles and rude noises – it reminds me of a Carry On film It's very nearly a good enough reason in itself to buy the program.

The actual game is a high speed affair in which your little frog/zebedee character bounces around from platform to platform, collecting the usual goodies and passing the usual impassable obstacles.

The animation is very smooth and Thing – hardly an appropriate name for a super hero – actually seems to have a character, albeit a somewhat hysterical one

Other graphics are big and clear, just the thing for younger arcade addicts just beginning the process of brain decay

Program *Thing on a Spring*
Price *£7 95*
Micro *Commodore 64*
Supplier *Gremlin Graphics*
Alpha House
10 Carver Street
Sheffield S1 4FS

FREE KICK

Anirog's *Five-A-Side* is another football simulation for the Commodore 64, distinguished mainly by the fact that there are only five players on each side

The game works in the same way as other football games with joystick control of the man closest to the ball, and an option to play against the computer The computer plays surprisingly well even on the easiest level – you may find this off-putting

Graphically, this is a fairly poor game with small sprites for the players and annoying things like the way the ball sprite looks like it's in front of the goalie when in fact, it's in the back of the net Going some way to redeem the graphics is the software speech – just before kick-off the computer does an impersonation of several thousand people singing 'Ere we go are we go ere we go' in a suitably Neanderthal voice It's stunning in a horrible kind of way

Actually, the game is a lot of fun, you get used to the graphics after a point and simply enjoy the pace of the action.

Commodore's *International Soccer* is still the one to buy if you want the best football game on the Commodore, but this one is a definite maybe for absolute addicts of computer football

Program *Five A Side*
Price *£5.95*
Micro *Commodore 64*
Supplier *Anirog*
29 West Hill
Dartford
Kent
DA1 2EL

DETAILED

Nonterraqueous is not, I think, a great name for a computer game On the other hand the alternative might very likely have been something like *Bouncing Bobby* so perhaps I'd better not whinge excessively

It's a very entertaining game though – another one of those Mastertronic efforts at £1 99 where £5 95 wouldn't have been too bad

The plot has you controlling a mechanical sphere through 1,000 screens seeking the means of the destruction of yet another set of alien baddies The game has a reaction element – dodge the wandering thingies and watch out of for the sudden photon blasts – and a tactical reasoning element – there are things to collect and problems to be isoed For example, at one point you need to activate a rocket but to do so must have retrieved some fuel and so on

No more or less original than most new games but beautifuly programmed with very smooth richly detailed sprites and a lot of care – all this for £1.99 A definite.

Program *Nonterraqueous*
Price *£1 99*
Micro *Spectrum*
Supplier *Mastertronic*
Park Lorne
111 Park Road
London NW8

BOB-A-JOB

The Scout Steps Out is an Amsoft computer title based around the everyday adventures of a boy scout It features such universally significant challenges as cleaning windows, gathering mushrooms (?) and diving for sea life

In fact it's one of the most bizarre looking games I've seen in a long while All the graphics are drawn in line only 3D, more commonly associated with games like *Battlezone* – here the graphics are static and look faintly ethereal and insubstantial. Curious

The game, though, is basically several varieties of platforms and ladders with appropriately scouty elements like pack leaders who chase you and flags to collect To begin with you have only one life and the game seems impossible – in fact the cornflakes prove the solution to this problem.

Hard to come to a strong conclusion about this one – the music is good, some of the graphics are clever and in some ways the strange 3D line effect is successful – in other ways it looks confused and makes it difficult to judge exactly where you are Worth a look anyway.

Program *The Scout Steps Out*
Price *£7 95*
Micro *Amstrad*
Supplier *Amsoft*
Brentwood House
169 Kings Road
Brentwood
Essex
CM14 4EF

GAME POINT

Super Brat is almost certainly the cheapest of the many tennis simulations around at the moment – it costs £1 99

For the money it's really very good, the graphics are not up to *Match Point* standards, but they are clear enough to see what's going on, and way beyond matchstick figures.

Controls have been reduced cleverly to three key presses left and right and a mixture of those and 'fire' determines the speed of the ball When fire is pressed in relation to the bat swing determines the direction

The title is actually fairly meaningless as so far the computer opponent hasn't questioned an umpire's decision or walked off the court.

A very good value game



Program *Super Brat*
Price *£1 99*
Micro *Spectrum*
Supplier *Atlantis*
19 Prebend Street
London
N1 8PF

New Releases

SHADED

Red Moon is the latest Level 9 Computing adventure and as ever it comes on around 300 different micros with graphics on some of them. It is an adventure in the classic tradition, which means it's chock full of magic, moon towers and crystals of power. The quest is to get the Red Moon Crystal returned to the Moon Tower where it can once more shine out over the kingdom of Baskalos, which sounds to me like a Portugese fishing village.

Aside from the usual extensive range of commands, the adventure adds a number of spells that may be created and used for specific purposes using the syntax Cast (name of spell).

The graphics, on the Spectrum version, were rather good, drawn quickly but with a lot of detail and shading. I died around 20 times in half an hour usually by plummetting down some abyss through not being able to see where I was going. This proves either that I am a masochist or that this adventure is pretty addictive.

Program *Red Moon*
Price *£6.95*
Micro *Spectrum*
Supplier *Level 9 Computing, PO Box 39, Weston-super Mare, Avon, BS24 9UR*

Red Moon
Level 9 Computing

SPIN-OFF

Alex Higgins World Snooker is a simulation for the Amstrad of TV's favourite sport. Don't be deceived by the Alex Higgins part, his only appearance in the game is on the loading screen. This is a shame, in a way I'd have liked to see a computer opponent programmed to play like Higgins, but I don't suppose a Z80 is a fast enough processor.

There isn't in fact a play computer option at all – this is logical really since it would be possible to make it play infallibly thereby removing any point in challenging it. Conversely it could only be made to miss shots by some fairly artificial 'fudging' of its logic routines which would equally remove any real sense of competition.

Still, unlike many sports simulations it is a game that can be played alone. The thrill of planning and potting shots is enough without competition. Visually it looks neat, big graphics for the balls and a clever system for force, direction and spin which means all can be fixed using a joystick. The only problem is that this means it is impossible to

Pick of the week

PLEASURE DOME

Were Barbara Cartland to appear as a drug taking go-go dancer in *Miami Vice*, I couldn't be more shocked. *Frankie* — the computer game tie-in with everybody's favourite popsters Frankie Goes To Hollywood and "obviously it must be a merchandising boring old guide the little Frankie sprite through the 900 caverns collecting records still we should ship thousands before anybody notices and the reviews come out deal' – is staggeringly good.

It mixes original playing ideas with foot-tapping playability in even measures.

It isn't a guide the sprite through the caverns job at all. Rather, it's a sort of subversive *Dun Darach* where you guide a strange central figure towards pleasure and enlightenment – the first stage of this enlightenment being to discover what you're supposed to be doing there at all.

It works like this: you control a central figure who moves from house to house in a suburban street, looking through the various rooms and moving through hallways. The screen displays each new room as you move it through a door in a previous room.

This figure can raise an arm with which to examine objects like fridges and cupboards. Should these contain any useful items, an icon screen appears and the objects may be picked up using the ever popular cursor-controlled hand.

The houses are chock full of objects from pleasure pills to keys to fish to videos and floppy discs. Many are important – for example, if you have a video and place it in a video recorder you get a screen of what looks like a portion of screen, providing some sort of clue. There is also a cat which may want milk, and plaster ducks on the wall which sometimes take flight.

At some point I came across a dead body and enigmatic messages started to appear – my best guess is that they form some kind of logic test but who knows.

Visually, the game is superbly detailed and the sound wonderful. Whilst loading you get a surprisingly effective arrangement on three channels of *Relax* and whilst playing you get some throbbing music of the kind usually found around halfway through a Frankie 12".

The atmosphere has a strangeness and surrealness seldom found in computer games and the game is very addictive.

Put it this way, I just put it on for a quick play and two hours disappeared. It's out next week.

Program *Frankie*
Price *£9.95*
Micro *Commodore*
Supplier *Ocean, 6 Central Street, Manchester*

This Week

Program	Type	Micro	Price	Supplier
North Sea Bullion	Ad	Amstrad	£2.95	Kuma
Red Moon	Ad	Amstrad	£6.95	Level 9
Shadow of the Bear	Ad	Amstrad	£9.95	Kuma
Everyone's a Wally	Arc	Amstrad	£8.95	Mikro Gen
Jump Jet	Arc	Amstrad	£9.95	Anirog
Red Moon	Ad	BBC	£6.95	Level 9
Confuzion	Arc	BBC	£6.95	Incentive
Music Master	Ut	C16	£14.95	Supersoft
Word Perfect	Ut	C16	£12.95	Supersoft
64	Arc	Commodore 64	£4.95	PSS
Confuzion	Arc	Commodore 64	£6.95	Incentive
Five a-Side	Arc	Commodore 64	£9.95	Anirog
Frankie	Arc	Commodore 64	£9.95	Ocean
Out on a Limb	Arc	Commodore 64	£8.95	Anirog
Red Moon	Arc	Commodore 64	£6.95	Level 9
Games Aid	Ut	Commodore 64	£4.00	Sigma Soft
Confuzion	Arc	Electron	£6.95	Incentive
Cuthbert in Space	Arc	QL	£19.95	Microdeal
Hopper	Arc	QL	£19.95	Microdeal
Lands of Havoc	Arc	QL	£19.95	Microdeal
Crystal Frog	Ad	Spectrum	£3.00	Sentient
Malice in Wonderland	Ad	Spectrum	£2.99	Sentient
Red Moon	Ad	Spectrum	£6.95	Level 9
Sceep	Ad	Spectrum	£3.95	Sentient
The Amulet	Ad	Spectrum	£3.95	Sentient
The Key to Time	Ad	Spectrum	£5.00	Sentient
55	Arc	Spectrum	£6.95	PSS
Highway Encounter	Arc	Spectrum	£7.95	Vortex
Nonterraqueous	Arc	Spectrum	£1.99	Mastertronic



express exact amounts for each parameter – you simply judge it by the length of a coloured line

The scrolling is a little jerky, but not unacceptably so and despite the fact that it took me 20 shots to sink the first red, I recommend it as the best Amstrad snooker to date

Program *Alex Higgins World Snooker*
Price *£7 95*
Micro *Amstrad*
Supplier *Amsoft*
169 Kings Road
Brentwood
Essex
CM14 4EP

WORD FIND

Word Perfect is a word processor for the C16 (which a few people have) and the Plus 4 (which even fewer people own) On the C16 the package leaves you with around two A4 pages worth of memory – enough for most purposes

It's a very easy system to use, having a 'what you see is what you get approach with the exception of text width, which requires you to scroll left and right making the TV screen a 'window' on the copy

It has all the basic facilities of automatic justification, tabs, moving and copying text and even a word find option, although it will not automatically replace words.

The manual is brief as the system is essentially very simple – there are very few commands to learn in order to get under way It's nothing fancy but equally lacks nothing vital and at £12 95 on tape it's pretty cheap too

Program *Word Perfect*
Price *£12 95*
Micro *C16*
Supplier *Supersoft*
Winchester House
Canning Road
Wealdstone
Harrow
Middlesex HA3 7SJ

A CHALLENGE

Abu Simbel Profanation is a multi screen game with Egyptian setting and theme. You are Johnny Jones an intrepid explorer (does this ring any bells?) and have to escape from the mystic temple of Abu Simbel. This involves many left, right, jump in the classic tradition and some very nifty detailed graphics

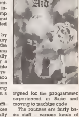
It has been produced by the same Spanish company that produced *Rocco* – the very well animated boxing game The graphics actually lift what would be really a rather boring game into something fairly compulsive For one thing the central hero seems to be a flexible green bubble with legs reminding me more of a Mr Man than a superhero.

The game is horribly difficult, the first screen takes ages to negotiate successfully and whilst you get several lives, you go straight back to the beginning of the screen each time you fail

This is certainly one of the better *Manic Miner* style timing games For addicts of that kind of game this is the hardest challenge you'll have faced in a long while

Program *Abu Simbel Profanation*
Price *£7 95*
Micro *Spectrum*
Supplier *Gremlin Graphics*
Alpha House
10 Carver Street
Sheffield
S1 4FS

FUNCTIONAL



Games Aid is not a games designer but a collection of machine code routines, pokes and tips and a character set redesigner It is designed for the programmer experienced in Basic and moving to machine code

The routines are fairly basic stuff – various kinds of screen scrolls, sound effects, special visual effects.

The character set designer is rudimentary but functional. I really only have two objections to the package One is that at various points you have to note down addresses and poke figures from the screen, and then type them in I can't help thinking this could have been done more elegantly

The second objection is that all the stuff here has cropped up at one time or another in *Popular* (and indeed in other magazines) and you're really paying for the convenience of having them all together

Program *Games Aid*
Price *£4 00*
Micro *Commodore 64*
Supplier *Sigma Soft*
6 Pine Dale
Rainford
Merseyside
WA11 8DP

This Week

That's the Spirit	Arc	Spectrum	£7 95	The Edge
Thing on a Spring	Arc	Spectrum	£1 95	Gremlin Graphics
Vegan attack	Arc	Spectrum	£1 99	Atlantis
Super Brat	S	Spectrum	£1 99	Atlantis
Blast	Ut	Spectrum	£24.95	Oxford Computer

Key **Ad** – adventure **S** – strategy-simulation
Arc – arcade **Ut** – Utility
Ed – education

Anirog Victoria Industrial Park Victoria Road Dartford Kent DA1 5AJ 0322 92513 **Atlantis** 19 Prebend Street, London N1 8PF 01-226 6703 **Gremlin Graphics**, Alpha House 10 Carver Street Sheffield S1 4FS 0742 753423 **Incentive** 54 London Street, Reading RG1 4SQ 0734 591678 **Kuma** Kuma Computers, 12 Horseshoe Park Pangbourne RG8 7JW 07357 4335 **Level 9** 229 Hughenden Road, High Wycombe Bucks HP13 5PG 0494 26871 **Mastertronic** Park Lorne 111 Park Road London NW8 7JL 01-402 3316 **Microdeal** 41 Truro Road, St Austell Cornwall PL25 5JE 0726 73456 **Mikro-Gen** 44 The Broadway Bracknell, Berks 0344 427317 **Ocean** 6 Central Street, Manchester M2 5NS 061 832 6633 **Oxford Computer** Hensington Road Woodstock Oxford OX7 1JR **PSS** 452 Stoney Stanton Road Coventry CV6 5DG 0203 667556 **Bantient**, Branch House 18 Branch Road Armley Leeds West Yorkshire LS12 3AQ 0532 781136 **Supersoft** Winchester House, Canning Road, Wealdstone, Harrow Middlesex HA3 7SJ 01-861 1166 **The Edge**, 31 Maiden Lane, Covent Garden, London WC2E 8LH 01-240 1422 **Vortex** 24 Kansas Avenue Off South Langworthy Road, Salford M5 2GL. 061 872 4747



The IBM Crash of 1995

If I predicted that within ten years, IBM that mightiest of multi-nationals, would be finished as major force in computers, your reaction would probably be "This man's a complete idiot"

After all, we are now clearly at the beginning of the real computer age, with processing power and memory storage increasing in leaps and bounds at the same time as costs reduce just as quickly. Surely then, the largest, most successful, best equipped and best staffed company possessing vast financial resources, is best able to take advantage of such a situation?

Not in my opinion. I await developments over the next few years with interest, as the penny slowly drops, both within IBM and with its investors.

IBM has built itself up brilliantly over the past few decades. Having started by making a few computers at great cost which only governments and few of the most powerful corporations could afford, it gradually widened the base of its operations with machines that grew in capability and which steadily got cheaper, reaching down to middle-sized companies across the world.

Suddenly, in the late 1970s a revolution occurred and the micro arrived. Aimed at the home market, mainly used for games, and having only the faintest connection with the business mainframes made by IBM. After all, the micro was little more than a toy with interesting potential.

Since that time, though, the micro has been accelerating upwards in capability, taking on all kinds of sophisticated tasks, in some cases – such as spreadsheets for financial planning – using software that opened up new applications even ahead of mainstream computing. Other innovative software programs have turned micros into valuable business tools available to everyone, with word processing and database applications getting general acceptance.

At some time, not too far away, the point will be reached when micros will be capable of doing all that mainframes in the lower and middle categories currently achieve. In the process satisfying the needs of probably over 80% of all businesses, all for a great deal less investment in equipment and skilled people than at present.

Widespread computer literacy, user friendly systems and advanced software will transform the computer scene, completely de-mystifying and wiping out all those company specialist departments filled with expensive computer professionals.

On the hardware side, the 32-bit micro (and its successor), with full multi-tasking and multi user facilities, will come down still more in price. It will be backed up with cheap laser printers, have massive gigabyte Ram and Rom storage at trivial cost based on the laser-operated compact disc system.

At which point the whole emphasis and main profit areas in the industry will switch from hardware to software. As nearly every capable computer manufacturer would then be able to put together a state-of-the-art package tailored to an individual customer's need, using bought in equipment from specialist producers, such as processors from Motorola, laser disc memory from Sony/Philips, and so on for laser printers, etc.

In such a situation IBM becomes the company least able to cope. Having grown by always being ahead of the field in technology, and able to select its own price structures with little interference from the market forces that apply to most other industries, it has gotten fat and pays salaries way above the norm.

Soon it will be faced with rat race competition from lean hungry companies having less overheads at a time when success will be more determined by economic prices than technical advancement.

IBM's only possible direction under these pressures will be to contract sharply and very painfully in size (paying out redundancy amounts that would cripple a small nation) and concentrate solely on super computers at the top end of the range until the micro catches up again.

The present emphasis on compatability with IBM by most other makers is, I believe, a passing phase based purely on the belief of contemporary purchasers in the myth of the IBM name. Greater computer literacy will quickly expose this to be an unnecessary and expensive consideration.

Indeed, the very first small sign that confirms my belief that IBM will be driven up-market from whence it came has already occurred, with the announcement of its departure from the home computer market in the USA by deciding to drop their PCjr model.

Vic Lewis

11 – 1?

Puzzle No 166

I have in front of me seven cards numbered with a digit from 1 to 7, no digit being repeated.

1 2 3 4 5 6 7

If I were to shuffle them up and deal them in a row, what is the probability that the seven-digit number so formed will be exactly divisible by 11?

At first sight, I would estimate the probability to be about one chance in 11 – but is this correct? Of course, such tricks as inverting the '6' to make a '9' are not allowed.

Solution to Puzzle No 162

In the crossnumber, a, b, c, and d, are 39, 33, 37, and 97 respectively, and A, B, C, and D are 1521, 1089, 1369, and 9409

```
10 FOR A=32 TO 99
20 FOR C=32 TO 99
30 A$=STR$(A) C$=STR$(C)
40 B$=LEFT$(A$,1)+LEFT$(C$,1)
50 D$=RIGHT$(A$,1)+RIGHT$(C$,1)
60 B=VAL(B$) D=VAL(D$)
70 SA=A*A SB=B*B SC=C*C SD=D*D
80 IF SA<1000 OR SB<1000 OR SC<1000 OR SD<1000
THEN GOTO 110
90 SA$=STR$(SA) SB$=STR$(SB) SC$=STR$(SC)
SD$=STR$(SD)
100 IF MID$(SA$,1,1)=MID$(SC$,1,1)AND MID$
(SA$,1,1)=MID$(SA$,4,1)AND MID$(SC$,4,1)=MID$
(SD$,1,1)AND MID$(SD$,4,1)=MID$(SB$,4,1)THEN
PRINT A,C
110 NEXT C,A
```

As each number a, b, c, and d, has a four-digit square, they must be in the range 32 to 99 inclusive. The program tests samples for two of these variables (a and c) in the two *For/Next* loops. Once any two values have been assigned in that way, the remaining values for b and d are, of course, automatically determined. The squares of each of these values is then calculated, and these are tested to check that corresponding digits which interlock in the grid are alike.

Winner of Puzzle 162

The winner is R Evans of Bridgend, Mid Glamergan, S. Wales, who receives £10

Rules

The closing date of Puzzle 166 is August 14

The Hackers

It's about that project-leader's toolbox you sold me...



Yes.... So?...



ATARI
ST
520ST
POWER WITHOUT THE PRICE
THE NEW ATARI 520ST
USER FRIENDLY GEM OPERATING SYSTEM
FREE SOFTWARE AND FUTURE EXPANSION
512K RAM
MOUSE
GEM
B/W MONITOR
500K 3.5" DISK DRIVE
KEYBOARD (95 KEYS)
£749
ATARI 520ST SPECIFICATION
MACINTOSH v F1e v 520ST
APPLE
APRICOT
ATARI
PRICE
£2,984
£1,362
£749
PRESS COMMENT
SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX
SEND FOR FREE ATARI ST LITERATURE
SILICA SHOP
WE ARE THE UK's No1 ATARI SPECIALISTS
ATARI
PLEASE SEND ME FREE LITERATURE
ON THE NEW ATARI 520ST COMPUTER
SILICA HOTLINE
01-309 1111

Herbert's

Dummy Run

Trouble In Store for Herbert

Spectrum 48K £9.95
Commodore 64 £9.95
Amstrad CPC 464 £9.95



MIKRO-GEN

44 The Broadway, Bracknell, Berks. 0344 427317